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DEPARTMENT OF AGRICULTURE ANNUAL REPORT, 1955
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PART I—AGRICULTURE IN 1955

Policy

Although Emergency conditions still prevailed, the tension and strain under which our staff in the troubled areas have had to operate was greatly eased during the year under review. Progress in the development of the African land units has been remarkable and has been the subject of very favourable comment by many well-qualified visitors and observers. Great credit is due to the persistence and enthusiasm of the field officers of the Department, and grateful thanks are due to officers of the Administration at all levels and at all times for their support and assistance. After many years in Africa of disappointment at the slowness of results and lack of response from the people the writer, for the first time, feels that a new spirit is awakening, that there is a desire to farm and to farm well and that the years of lethargy, indolence and frustration are behind us. We on the advisory side can now reap a reward from the patient striving of officers in the past, in the '20s and '30s as well as since the war. The reward is in the form of achieving results, of seeing things happen. This new movement is not of course universal but in many widely scattered areas of Kenya one can now sense that one is working with farmers who are proud of their achievements and of their profession.

Two events in the year 1955 will undoubtedly have far-reaching effects on the pattern and place of development of the agricultural industry in Kenya during the years that lie ahead. I refer to the publication and enactment early in the year of the Agriculture Bill—an Ordinance to promote and maintain a stable Agriculture, to provide for the conservation of the soil and its fertility and to stimulate the development of agricultural land in accordance with the accepted practices of good land management and good husbandry—and, later in the year, the publication of the report of the East Africa Royal Commission. The Royal Commission Report is still under consideration by Government and comment on it is inadvisable except, perhaps, to express satisfaction at the Commission's general endorsement of the technical and economic aspects of our agricultural policy.

The Agriculture Act is an advanced and imaginative piece of legislation which owes its origin and acceptance to Kenya's trust and faith in the experienced guiding hand of the then Minister for Agriculture, Sir Ferdinand Cavendish-Bentinck. It heralds a new and more democratic approach to the problems of agricultural development. It is founded on the belief that the agricultural community recognizes and accepts its responsibility to use the land in its care beneficially and to obey the fundamental laws of stewardship and sound husbandry. The Act accepts that the farming community will not continue to obey rules of husbandry or conservation because they are rules but will do so if it is convinced that the rules are sound and just. It is a natural successor to the Land and Water Preservation Ordinance, first applied in 1940. It recognizes the vital and essential part played by Production Committees (set up as a war-time measure) in the furtherance of agricultural development and transforms these committees into more democratic and more powerful bodies. Thus more and more power and discretion is placed in the hands of the new Agricultural Committees; the wrongdoer will be judged by his peers and that potent weapon of

persuasion, public opinion, reinforced of course by legal requirements and obligations, will, it is believed, be effective in bringing about a more general and complete compliance with the duties of a man towards his land. The task of the men chosen to serve on these committees is onerous and often thankless and so very much depends on persuading the right men to serve, but in the short period of operation there is every indication that the right men have come forward and that they will perform their increased duties with certainly no less a sense of responsibility than was shown by members of the Production Committees. In the more advanced agricultural areas officers of the department will act more and more in an advisory capacity and the responsibility will fall on the shoulders of Agricultural Committees. The Agricultural Officer is, of course, a member of these committees and can if necessary appeal to the Minister against a decision of the committee if he considers it to be technically unsound but it is believed that the occasions on which this right will be exercised will be exceedingly rare.

In the policy section of the 1954 report and referring mainly to the African areas, I touched on the human element as one of the main obstacles to agricultural progress. We sometimes tend to forget that the farmer himself is the king-pin and that everything depends on his outlook, his wishes, his industry and his desires. Again, too, there is a tendency in some quarters to regard the problem as a purely technical one. Advances in the technical field without corresponding advances in the economic, social and moral aspects of the problem may serve little purpose. To those who advocate that all that is necessary for rapid progress is to make available the aids of modern science, the tractor, the machine, the fertilizer, the insecticide, I would recommend a study of the evolution over the centuries of the present advanced pattern of farming in England. The slow and gradual advances in the technical field had to keep in step with the many other factors which impinge on the development of the industry as a whole. In the short space of 50 years we are striving for, and according to some critics are expected to achieve what, in England, took over a thousand years of enterprise and endeavour. The enclosure movement, for example, and to which I will refer later, was spread over four centuries in England.* Is it not understandable that the African farmer is sometimes bewildered! In a world which modern methods of communication have made so small, the African can see or read of the practices and benefits of advanced agriculture and understandably demands them for himself. But does he appreciate that centuries of human endeavour have been necessary to reach that degree of perfection; does he realize that corresponding advances are necessary in everything which governs and conditions his life? We can learn from history and experience, and it is not suggested that centuries must elapse before high farming standards are reached, but we must not delude ourselves into an over-simplification of the problem. We must recognize that these sudden changes are fraught with dangers and with our limited technical knowledge and the unpredictable human factor innovations should be introduced with caution through experimental and pilot stages.

It is useless to indulge in pipe-dreams of how agricultural development might be speeded up given a certain set of conditions. By and large, in the African areas, we have the position of innumerable small units of land, so small in many cases that the economic use of modern aids is quite impractical. Can these units be consolidated, re-orientated, planned and developed under improved, modern methods? This is the task we have set ourselves and the reader will find frequent detailed references to this in the individual officers'

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* *Industry in England* by Gibbins

reports which follow. It will be seen from these reports that very considerable headway has already been made. Again, however, the cold douche must be applied. It is merely wishful thinking to suggest that the success of the consolidation and enclosure movements will automatically bring about increased production or improved husbandry and higher standards of living. The movements, which we welcome and encourage in every possible way, merely give the farmer the means to better his lot. He holds the key. In our guidance of consolidation and reallocation of land we endeavour to ensure that holdings are so shaped and orientated that efficient land use can be practised. Given the co-operation of the people and the necessary staff and finance, these essential steps towards better husbandry can be taken within a relatively short space of time. Once the form of tenure has received general acceptance the issue of negotiable titles can also proceed relatively quickly. But we must realize that many, many years will go by before sound and advanced systems of farming are the general practice. Later in this report references will be found to the farm-planning service which has been developed as a follow-up to consolidation and enclosure. For the individual this service involves capital development in the form of fences, water supplies, buildings, roads of access, etc., and the acceptance of a farming system in which the cropping and stocking policies are fairly rigidly laid down. On account of our imperfect technical knowledge and the uncertainties of the economics of the system of management we ask the planned farmer to adopt, it is essential to proceed with great caution. There are many instances in many places in Africa where model or ideal holdings have been established but through lack of continuity in the supervising officers and through lack of persistence in the face of set-backs, the majority have fallen by the wayside. It is essential therefore not to proceed with farm planning beyond the stage where our staff may fail to provide the essential follow-up service of encouragement and guidance. The enthusiasm and pride of the planned farmer must receive constant support. This follow-up service is vital during the early years of development and capital outlay and can only be relaxed when returns in terms of £.s.d. make it evident to the farmer that our advice has been wise and that the farming system he has been asked to adopt is not only practical but in every way sound.

The irrigation schemes referred to in last year's report have made steady if not spectacular progress. A good many not unexpected difficulties, both administrative and technical, have been met with. Some have been overcome but others are still with us and solutions are being sought. At the end of the year we received the welcome news that Mr. G. H. R. Dew, until recently General Manager of the renowned Sudan Gezira Scheme, had accepted appointment to the department, and his experience and guidance will be invaluable in the orderly development of the schemes. The very ready and very valuable assistance given by officers of the East African Agriculture and Forestry Research Organization, in particular Dr. Pereira, is gratefully acknowledged. In co-operation with officers of the Hydraulic Branch and the department, Dr. Pereira has directed his researches mainly to the economic use of what is after all relatively scarce and costly, irrigation water. It will be a question of relating his results to the practical capabilities of what must be untrained and, in the early stages, inept tenants. Results in terms of experimental crops grown are encouraging. We have a lot to learn but given time we feel confident that at least the technical agricultural difficulties can be overcome. The hard economic factors in terms of return on capital invested, or even in terms of individual incomes, do not at first sight present a very favourable picture, but it must be accepted that these are essential long-term developments in view of our over-population problems and the need to intensify and increase production if the country is to continue to support its ever-increasing population. As we gain experience and knowledge, and as new techniques are developed, new and high-priced cash crops introduced and the

cultivator attunes himself to the new mode of agriculture, there is little doubt that our present modest and practical estimates of production in terms of crops and cash will show material improvement.

Weather

While rainfall totals could not be described as markedly different from the average in Nyanza, Rift Valley, Central and Southern Provinces during the year distribution was such as to materially affect farming operations. The Coast Province as usual had a difficult time and the only good rains fell in the period April to June.

In Nyanza while registered rainfall was much the same as the year before, distribution through the Province was more even. Unfortunately there was a drought period from March to May which was particularly severe in Sotik and affected crop production even in North Nyanza. The year terminated in a deluge of unseasonable rainfall which though beneficial to grazing will have an adverse effect both on surpluses of food crops available for sale and the coming planting season.

The Rift Valley Province suffered from badly distributed rains for crop production. While the total fall over the year was close to the average for the Province rain fell out of season in January and February. This was followed by dry weather after planting in April which persisted until early in July. Very good rains in July, August and September were followed by a short dry period with rain again in November and December. The result of this pattern of rainfall has been that early planted, small grained cereal crops suffered a check in growth with poor tillering. The later onset of good rains helped to fill out the maize crop but has hampered harvesting of cereals in the higher areas. Grazing in the semi-arid areas of the Province has benefited enormously from the extended rainfall.

Heavy thunderstorms were experienced in January and February throughout the Central Province followed by a prolonged dry period and a late onset of the long rains. These conditions resulted in good crops from the 1954 short rains plantings and below average crops from the long rains plantings. In the lower areas of the Province the long rains ended abruptly with consequent crop losses while in the higher areas entirely unseasonal rain followed the gathano period right up to the end of the year. Ripening of gathano crops was delayed and yields were reduced by fungus diseases. While Kiambu and the lower areas of Fort Hall and Embu districts have suffered from lack of rain at the right time Meru district on the other hand will have a good harvest as a result of excellent rains in the October to December period.

The Southern Province suffered a year of badly distributed rainfall and in parts of Kitui district there was no significant rainfall throughout the year until November. Both crops and grazing have suffered in consequence there being heavy livestock losses in the drier parts of the Province and considerable importations of maize. By the end of the year, however, the delayed but very good short rains gave promise of excellent harvests and the restoration of grazing areas was already beyond expectations.

In the Coast Province good general rains fell over the period April, May and June, 1955, in greater or lesser amounts and this was the only reliable growing period during the consecutive eighteen months July, 1954, to December, 1955. Crops planted with the onset of the rains yielded well but about one-fifth of the maize crop which was late planted failed and long-term crops suffered from the lengthy drought periods.

(The Director of Agriculture is indebted to the Director of the East African Meteorological Department for the following detailed notes on weather conditions and for Table A which shows the rainfall over the main agricultural areas of Kenya during 1954.)

Rift Area.—Amounts well above average were recorded in February and December and to a lesser degree from August to October. The other months were below average but the total for the year was only one per cent below normal.

West Rift.—Conditions were drier than usual from March to July and again in November. Totals above average were recorded in all other months resulting in an excess of 7 per cent for the year.

East Rift.—The total rainfall for the year was slightly above normal. Deficiencies occurred in the months of March, May to July, October and November, but totals well in excess of average were recorded in February, August, September, and December.

Trans Nzoia.—Amounts varying from 3 per cent to 75 per cent below average were recorded over the period February to July and November also showed a deficit. In January and December totals were well above average with good rains in August and September. October rainfall was about normal and the total for the year was slightly below normal.

Nyanza.—Rainfall for the year was slightly above average. Totals in excess of average were recorded in January, February, July to October and December. The month of May was very close to average but the other months showed a deficit.

Main Coffee Areas.—February rainfall was well above average but the "long rains" were disappointing with a fairly dry March and both April and May showing a deficit followed by comparatively dry weather in June and July. August and September, however, were wetter than usual and October was only slightly below normal. November was very much drier than is usual during the "short rains" but this was followed by good rains in December. The total for the year showed a deficiency of 7 per cent.

Coast Area.—Amounts above average were recorded in January and February with March well below average. From April to June amounts were in excess of average but from July to the end of the year conditions were much drier than usual resulting in a deficit of 13 per cent for the year.

TABLE A.—RAINFALL OVER THE MAIN AGRICULTURAL AREAS OF KENYA, 1955

Districts	Rift		West Rift		East Rift		Trans Nzoia		Nyanza		Main Coffee Areas		Coast	
No. of Stations	19		14		19		22		22		26		20	
	Mean Fall, 1955	Average Fall	Mean Fall, 1955	Average Fall	Mean Fall, 1955	Average Fall	Mean Fall, 1955	Average Fall	Mean Fall, 1955	Average Fall	Mean Fall, 1955	Average Fall	Mean Fall, 1955	Average Fall
	In.	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*	*In.*
Jan. ..	0·68	0·84	1·89	1·49	0·94	0·85	1·86	0·69	3·02	1·89	1·10	1·24	1·19	0·70
Feb. ..	2·74	1·23	4·13	2·43	2·11	1·00	1·21	1·25	3·76	3·02	4·32	1·41	0·91	0·50
March	0·38	2·79	2·17	3·91	0·42	2·29	0·60	2·73	2·98	5·27	2·21	4·19	0·92	2·10
April ..	4·73	5·81	5·93	7·63	5·52	5·47	5·67	6·05	8·39	9·38	7·91	9·43	6·76	6·58
May ..	2·90	5·13	5·29	6·77	2·77	4·18	3·38	6·25	9·03	9·19	4·97	5·28	12·48	12·15
June ..	1·53	3·45	2·96	5·25	1·50	2·75	3·45	4·68	3·63	5·82	0·21	1·57	5·86	4·32
July ..	3·16	4·55	5·26	5·77	3·50	4·30	5·81	6·12	5·70	5·03	0·35	0·67	2·17	3·17
Aug. ..	7·65	4·52	9·47	6·37	6·92	4·34	7·37	6·50	6·95	6·16	1·28	0·90	1·17	2·47
Sept. ..	4·61	2·53	8·54	4·98	4·03	1·96	6·10	3·92	7·39	5·61	1·39	1·00	0·49	2·31
Oct. ..	2·57	2·18	2·84	2·57	1·63	2·02	2·98	3·02	5·09	4·33	2·43	2·68	1·13	3·23
Nov. ..	2·22	2·65	2·01	2·82	2·47	3·14	1·95	2·23	3·64	4·29	3·23	5·93	2·50	2·89
Dec. ..	4·00	1·75	5·58	2·35	3·28	2·04	3·24	1·16	6·52	3·37	5·47	3·42	2·11	2·63
Year ..	31·17	37·43	56·07	52·34	35·09	34·34	43·70	44·60	66·10	63·36	34·87	37·72	37·69	43·05

Food Production in African Areas

In Nyanza Province the surplus of food crops likely to be available for sale will be less than in 1954. In some cases reduction of price has affected the amount offered for sale but the weather has been generally less favourable for the production of food crops than last year. Unseasonable rain at the end of the year has made it difficult to market maize in a satisfactory condition and the surplus offered may be still further reduced as a result.

In general the maize crop in the Rift Valley Province is a good one. An exportable surplus of 120,000 bags is expected from the Nandi district. Both sorghum and finger-millet are still widely grown in all districts but are consumed locally. The acreage under wheat continues to increase in the Nandi and Elgeyo districts and an output approaching 10,000 bags is expected.

In Central Province the long rains maize crop was not a very good one. Crops in the west of the Province (except Kiambu) were generally rather better than those in the east except in the Nyambeni hills of Meru district where a good crop alleviated a famine in the south of the district. Small surpluses of maize, bulrush millet and beans were marketed during the year but these were very much less than in 1954. However greater quantities of Dolichos beans, pigeon peas and cowpeas were disposed of in 1955.

In the Southern Province poor harvests from the 1954 short rains crops failed to meet subsistence needs. Long rains crops were no better and maize importation has been necessary throughout the year. Machakos district imported 79,000 bags during the year and Kitui district had such a bad year that imports of food amounting to 95,000 bags were needed.

The food situation in the Coast Province was alleviated by the fact that though the long rains were a virtual failure in the hinterland it was the short rains which failed in the Coastal areas. In the Kwale district where no surplus of cereal crops was produced, the cassava crop insured an adequate food supply supplemented by fish, meat and some derivative of the coco-nut tree. The maize crop was a total failure in the Teita low country and food supplies had to come from the hills—apart from a small swamp production of sugar, bananas and colocasia. Elsewhere in the Province food supplies sufficed for subsistence needs.

Agricultural Exports, 1955

The total value of agricultural exports increased from £17,823,241 in 1954 to £22,696,097 this year. This increase was mainly due to increased export of coffee, maize, tea, pyrethrum and wattle bark extract.

Exports of the following nine commodities exceeded £500,000 in value:—

	Position 1954	*1954* £	*1955* £
1. Coffee	(1)	5,711,337	8,926,908
2. Tea	(2)	2,062,654	2,761,151
3. Wattle Extract	(4)	1,668,037	2,260,853
4. Sisal	(3)	2,041,563	1,958,631
5. Maize	(5)	1,013,192	1,665,422
6. Pyrethrum incl. Extract ..	(6)	905,047	1,238,478
7. Cotton	(7)	796,041	691,649
8. Sheep and Goat Skins ..	(9)	622,353	670,116
9. Cattle Hides	(8)	759,217	586,704

The following table shows certain other agricultural exports:—

	Position 1954	*1954* £	*1955* £
10. Butter	(10)	483,117	513,575
11. Wattle Bark	(13)	219,979	265,412
12. Wool	(14)	214,530	256,908
13. Castor Seed	(12)	253,190	195,653
14. Other Hides and Skins	—	81,343	159,359

Table B gives fuller details of domestic exports from Kenya in 1955, while Table C gives comparative domestic quantities and values of exports of Kenya produce for the years 1939 and 1952-55 inclusive.

TABLE B.—DOMESTIC EXPORTS—KENYA, 1955

(Figures provided by the Commissioner of Customs and Excise)

Articles	Unit of Quantity	Quantity	Value
			£
LIVE ANIMALS, CHIEFLY FOR FOOD			
Bovine cattle, including buffaloes	Number	601	25,740
Sheep and lambs	,,	132	539
Swine	,,	33	534
Poultry	,,	772	243
Goats and kids	,,	35	66
Other, n.e.s.	,,	—	—
MEAT AND MEAT PREPARATIONS			
Meat: Fresh, Chilled or Frozen—	Centals of		
Meat of bovine cattle (beef, veal)	100 lb.	13,758	92,698
Meat of sheep or lambs (mutton, lamb)	,,	375	3,254
Meat of swine (pork)	,,	493	5,772
Poultry, killed or dressed	,,	343	4,749
Meat of goats and kids	,,	180	1,175
Other (including edible offals, horsemeat and game)	,,	973	8,432
Meat, Salted, Dried, Smoked or Cooked, not Tinned—			
Bacon, ham and salted pork	,,	5,418	70,998
Smoked, dried or salted beef and veal	,,	—	—
Smoked, dried or salted meats	,,	30	828
Meat, Tinned and Meat Preparations, Tinned and not Tinned—			
Sausages of all kinds not in airtight containers	,,	519	6,993
Meat and meat preparations in airtight containers	,,	195	1,807
Meat extracts and preparations of meat (including natural sausage casings), n.e.s.	,,	43	190
DAIRY PRODUCTS, EGGS AND HONEY			
Milk and cream, fresh (including buttermilk, skim milk, sour milk, sour cream and whey)	Imp. Gal.	5,847	1,103
Milk, sweetened or unsweetened, separated or skimmed	Centals of 100 lb.	69	452
Cream	,,	140	1,854
Milk and cream, other (in blocks and powder form)	,,	25	276
Butter in airtight containers or not	,,	33,777	513,575
Butter, clarified—Ghee	,,	277	4,071

TABLE B.—DOMESTIC EXPORTS—KENYA, 1954—(*Contd.*)

(Figures provided by the Commissioner of Customs and Excise)

Articles	Unit of Quantity	Quantity	Value
			£
DAIRY PRODUCTS, EGGS AND HONEY—(*Contd.*)	Centals of		
Cheese and curd	100 lb.	542	6,070
Natural honey	,,	4	40
Eggs in the shell	Number	735,640	10,928
Other dairy products, n.e.s.	—	—	342
CEREALS AND CEREAL PREPARATIONS	Centals of		
Wheat and spelt (including meslin), unmilled	100 lb.	—	—
Rice not in the husk, including polished and broken rice	,,	435	1,597
Maize (corn), unmilled (Indian corn)	,,	1,728,198	1,665,422
Oats, unmilled	,,	22	20
Millet, unmilled	,,	19,885	27,700
Meal and flour of wheat and spelt (including meslin)	,,	17,103	40,697
Meal and flour of maize (corn)	,,	14,060	17,107
Meal and flour of cereals, n.e.s.	,,	—	—
FRUITS AND VEGETABLES			
Edible nuts (including fresh coco-nuts) other than nuts chiefly used for the extracting of oil:—			
(*a*) Coco-nuts	,,	1,017	1,011
(*b*) Cashew nuts	,,	4,350	49,045
Vegetables, fresh and dry, roots and tubers, not including artificially dehydrated—			
Potatoes, not including sweet potatoes	,,	17,920	17,302
Beans, peas, lentils and other legumes (pulses) dry, including split	,,	14,438	36,784
Onions	,,	36	108
Garlic	,,	—	—
Other vegetables chiefly for human food	—	—	18,973
Other vegetables preserved or prepared in air-tight containers	Centals of 100 lb.	2,952	12,763
Flour and flakes of potatoes, fruits and vegetables (including sago, tapioca and all other starches prepared for use as food)	,,	1,141	1,210
SUGAR AND SUGAR PREPARATIONS			
Jaggery (Muscovado)	,,	26	55
Sugar, not refined	,,	493	1,376
COFFEE, TEA, COCOA, SPICES AND MANUFACTURES THEREOF			
Coffee, not roasted	,,	434,166	8,904,654
Coffee, roasted	,,	919	22,254
Tea	,,	129,441	2,761,151
HIDES, SKINS AND FUR SKINS, UNDRESSED			
Hides and Skins (except Fur Skins) undressed—			
Hides of cattle, undressed:—			
(*a*) Ground-dried	,,	1,930	12,070
(*b*) Suspension-dried	,,	50,966	457,396
(*c*) Wet salted hides	,,	26,178	116,565
(*d*) Pickled	,,	55	673
Calf skins and kip skins, undressed—			
(*b*) Suspension-dried	,,	184	3,339
(*c*) Wet salted	,,	—	8

TABLE B.—DOMESTIC EXPORTS—KENYA, 1954—(*Contd.*)

(Figures provided by the Commissioner of Customs and Excise)

Articles	Unit of Quantity	Quantity	Value
			£
HIDES, SKINS AND FUR SKINS, UNDRESSED—(*Contd.*)			
Sheep skins and lamb skins (except astrakhan, caracul, persian lamb, broadtail) undressed—	Centals of		
(*a*) Ground dried	100 lb.	111	905
(*b*) Suspension-dried	,,	13,938	182,047
(*c*) Pickled	,,	3	135
Goat skins and kid skins, undressed—			
(*a*) Ground-dried	,,	496	7,410
(*b*) Suspension-dried	,,	17,959	479,754
Crocodile skins	,,	615	39,978
Other hides and skins, n.e.s.	,,	13	521
Leopard skins, undressed	,,	4	1,479
Other fur skins, undressed	—	—	—
Sheep and lambs' wool—			
Greasy or back-washed	,,	2,374	39,876
Scoured	,,	11,444	217,032
OIL SEEDS, OIL NUTS AND OIL KERNELS			
Groundnuts (peanuts), green, whether shelled or unshelled	,,	12	56
Copra	,,	13,421	33,854
Soya beans	,,	—	—
Linseed (flax seed)	,,	—	—
Cotton seed	,,	—	—
Castor seed	,,	109,869	195,653
Sunflower seed	,,	37,354	54,288
Other oil seeds, nuts and kernels	,,	1,234	1,495
Raw cotton	,,	52,249	691,649
Flax and flax tow and waste	,,	207	1,296
Ramie and ramie tow and waste	,,	160	1,190
Sisal	,,	750,443	1,958,631
Mangrove bark	,,	4,725	4,200
Wattle bark	,,	182,239	265,412
Pyrethrum	,,	20,780	284,732
Papain	,,	4	320
Kapok	,,	84	32
Pyrethrum extract	,,	2,736	953,746
ANIMAL OILS AND FATS			
Oils from fish and marine animals	,,	12	250
Animal oils, fats and greases, excluding lard	,,	1,133	5,678
VEGETABLE OILS			
Cotton seed oil	,,	42	280
Groundnut (peanut) oil	,,	—	—
Coco-nut (copra) oil	,,	776	3,461
Sesame seed oil	,,	314	1,946
Other vegetable oils	,,	210	1,364
Hydrogenated oils and fats	,,	48	487
Beeswax	,,	1,547	32,766
Wattle bark extract	,,	744,201	2,260,853

TABLE B.—DOMESTIC EXPORTS—KENYA, 1954—(*Contd.*)

(Figures provided by Commissioner of Customs and Excise)

Articles	Unit of Quantity	Quantity	Value
			£
Essential Vegetable Oils			
Lemon grass oil	Lb.	—	—
Bitter orange oil	,,	—	—
Geranium oil	,,	6,014	14,990
Cedarwood oil	,,	100,060	23,548
Other	,,	7,448	2,774
Total			£22,696,097

Crops

Barley.—The production of barley from the 1954 crop was 214,582 bags (180 lb.) from 29,244 acres, an average yield of 7.30 bags an acre. The estimate of production from the 1955 crop is 161,356 bags from 28,511 acres, an average yield of 5.65 bags an acre. The slight decrease in acreage is accounted for by decreases in Nakuru and Uasin Gishu. In the Uasin Gishu and Trans Nzoia the crop is still mainly used for stock feed with small surpluses being sold to makers of proprietary feeding stuffs.

Cashew Nuts.—This cash crop is growing in importance in Kwale and Kilifii districts where the tree thrives on the lagoonal sands of the Coastal strip. The record crop of 1,540 tons was harvested from the areas north of Mombasa and 532 tons from the areas to the south of the port. Conditions in 1955 have been favourable to the crop and it is expected that the present crop will be an even better one. The value of the 1955 harvested crop to the producers at 20 cents a lb., was over £46,000. This is a good return from a peasant crop the main work involved in the production of which is the getting of the mature nuts from the ground.

Cassava.—The acreage of this crop continud to increase in Nyanza Province but mosaic infestation is widespread. Resistant varieties are being bulked for distribution. Sales of cassava flour in Nyanza increased from 262 bags in 1954 to 10,563 bags in 1955. Export outlets for cassava are becoming an important necessity whether in the form of starch or dried roots. While the crop remains unpopular in Central Province and makes little headway in Southern Province, in the Coast Province it continues to be a valuable source of food in drought periods. It is estimated that in Kwale District the main growing area of the Coast Province the acreage increased from 13,000 to 20,000 acres during the year.

Castor Seed.—This crop continues to thrive in the low rainfall areas of the Southern Province where it provides both shelter to parched lands and a cash return. Exports from the Southern Province in 1955 amounted to 41,500 bags worth £111,971 mainly from Kitui district. Small quantities are also bought by traders in the Coast Province.

Chillies.—These are the main cash crop of the Lower Teita area and are being increasingly produced in the Kwale district. Quality is seriously affected by the weather and its influence on fungus infections. Production in 1955 in the Lower Teita area fell from 375 tons in 1954 to 225 tons in 1955 and the value of the crop to the producers from £42,000 to £12,500 while in 1954/55 the average

price obtained was Sh. 1 per lb., the price for the 1955/56 crop fell to 50 cents per lb.

Coffee.—The area planted to coffee by European growers remained at much the same level as in 1954 and was 59,670 acres for 1955. Total production increased from 11,350 tons in 1954 to 12,335 tons in 1955. The average yield per acre rose from 3.7 cwt. to 4.1 cwt. Prospects for an even better crop in 1956 are good. Coffee retained its place as Kenya's most valuable export crop but the mean export value per ton for all grades decreased from £517 in 1954 to £379 in 1955. The quantity of coffee exported increased from 10,773 tons valued at £5,711,337 in 1954 to 19,423 tons valued at £8,926,908 in 1955.

The expansion in coffee growing by Africans continued. The number of licensed growers increased from 18,806 in 1954 to 24,486 in 1955. The corresponding increase in acreage is from 5,339 acres in 1954 to 7,511 acres in 1955 of which 1,721 acres are estimated to be in bearing. The majority of growers are situated in the Central Province to which Meru district contributes half the total for the Province. African coffee growing now extends to the Embu, Meru, Nyeri, Fort Hall and Kiambu districts of the Central Province, North and South Nyanza, the Machakos hills of the Southern Province and the Teita hills of the Coast Province.

The quality of coffee produced in the Central Province has remained high. Complaints about the Meru coffee being "soft" were not reflected in the price obtained for the crop. Coffee factories in Nyeri district though affected by the Emergency were able to work with the protection of home guard escorts.

In the Southern Province 131 acres of coffee have been established and the first factory will be built in 1956.

The coffee acreage in Nyanza Province is expanding rapidly in both Kisii and Kimilili and while plantings are still in the trial stage in Central Nyanza it is intended to make the first commercial plantings in Kericho in 1956. The factory at Kimilili turned out high quality coffee a sample of which won the Coffee Cup at the Western Kenya Show. In South Nyanza some high quality coffee was produced in spite of difficulties in drying the crop and in obtaining suitable materials for the construction of drying tables.

The cup presented by the Coffee Board of Kenya for the best African coffee was won by the Ngandori Co-operative Society of Embu district. This is the first time since the inauguration of the cup that it has left Meru district. At the Royal Agricultural Show in Nairobi Meru societies did extremely well and although only a small amount of coffee had been delivered to the mills they succeeded in obtaining first and second prize for Parchment coffee, second prize in all grades, and third prize for the best A grade.

The attached table shows that the quality of coffee produced by Africans has been good.

Year	*European grown coffee*	*Average payout per cwt.*		*African grown coffee*	*Average payout per cwt.*	
	Tons	*Sh.*	*cts.*	*Tons*	*Sh.*	*cts.*
1950/51 ..	9,642.40	374	09	85.15	393	51
1951/52 ..	15,891.53	416	59	84.14	425	47
1952/53 ..	11,908.10	435	77	180.23	456	89
1953/54 ..	10,885.68	509	00	338.33	568	87
1954/55 ..	11,849.10	373	27	749.73	378	62

Copra—Prices fell during the year from Sh. 22 to Sh. 15 per frasila. It is estimated that the best yields obtained on commercial plantations at the Coast

are in the region of 1,650 nuts per acre yielding 16.5 frasila of copra worth £12 8s. per acre. Elsewhere in less favourable areas the average yield is estimated to be about 1,000 nuts per acre and the return under £7 10s. per acre. In spite of these low average yields there are numbers of individual trees yielding up to 100 nuts per year. An average planting is 50 trees to the acre. Losses of nuts caused by Theraptus are known to be high and means of control are under investigation. The campaign to clean and "gap-up" neglected plantations continued during the year.

Cotton.—The final production figures for the 1954 planted crop which was ginned in 1955 were—

	Bales of lint of 400 lb. net		
	A.R.	*B.R.*	*Total*
Nyanza Province	9,785	1,001	10,786
Coast Province	1,711	466	2,177
Kenya total	11,496	1,467	12,963

In the Nyanza Province the 1955-56 crop is expected to be a slightly reduced one although a good crop is anticipated in South Nyanza. Campaigns in all districts to foster early planting have had to contend with apathy and idleness. Wastage of seed in planting continues to cost the industry substantial sums. In 1955 late planted crops have a better chance than usual owing to the late rains. The crop is estimated to produce a total of 8,000 bales.

In the Coast Province the 1955-56 crop is expected to be at least twice as good as the previous one. The following table gives a picture of the 1955–56 crop.

District	*Acreage*	*Variety*
Malindi	35,500	N. 17
Kilifii	3,000	S. 47
Kwale	60	S. 47
Tana River	1,200	N. 17
Taveta	720	S. 47

Estimated Production in Bales of Lint

	A.R.	*B.R.*	*Total*
Malindi Ginneries	3,150	1,350	4,500
Lamu Ginneries	210	90	300
Moshi Ginneries	98	42	140

The Nyanza crop was marketed through the Uganda Lint Marketing Board and the Coast crop was sold by tender. Exports of raw cotton decreased from 61,000 centals valued at £796,071 in 1954 to 52,249 centals valued at £691,649 in 1955.

Essential Oils.—Three farms in the Lumbwa district produced 3,500 lb. of oil from 250 acres. The average price to the grower was Sh. 80 per lb. Exports of geranium oil decreased from 61 cwt. valued at £18,072 in 1954 to 53 cwt. valued at £14,990 in 1955.

Flax.—Exports of this crop decreased from 22 tons valued at £3,341 in 1954 to nine tons valued at £1,296 in 1955.

Groundnuts.—Production of this crop is confined to Nyanza Province, and particularly South Nyanza district. Sales of groundnuts to the Produce Control organization increased once again from 1,412 tons valued at £43,465 in 1954 to 1,973 tons valued at £78,939 in 1955.

Kapok.—It is estimated that the Coast Province produce 110,000 lb. valued at £2,750. The crop is produced in the Malindi and Kwale districts and the bulk of it is handled by Malindi Ginneries who gin the kapok at the end of the cotton season.

Linseed.—Actual production from the 1954 crop was 944 bags (200 lb.) from 422 acres, the average yield being 2.23 bags an acre. The estimate of production from the 1955 crop was 2,500 bags from 1,250 acres, giving an average yield of two bags an acre.

Maize.—Actual production from the 1954 crop in the non-native areas was 1,586,683 bags (200 lb.) from 173,998 acres, an average yield of 9.11 bags an acre. The estimate of production from the 1955 crop was 1,271,555 bags from 164,230 acres, giving an average yield of 7.74 bags an acre. Whereas the acreage in the Nakuru and Nyeri districts has remained static, the Uasin Gishu shows a decline of 7,000 acres and Laikipia and Trans Nzoia show increases of 600 acres and 2,500 acres respectively. There have been no widespread insect attacks on the crop and most farmers now take routine action for stalk borer attack and losses due to soil-borne pests.

Deliveries to the Maize Control during the past two crop years ending 31st July were—

	Bags of 200 lb. net	
	1953/54	*1954/55*
Non-African Areas	743,218	1,000,326
African Areas	1,388,280	1,299,345
Total	2,131,498	2,299,571

From the 1955 crop anticipated surpluses are considerably less. Nyanza Province which produced most of the African-grown crop has recorded a drop in sales of about 250,000 bags due to a variety of causes mainly connected with the weather. Considerable illegal export of maize to Uganda took place in the latter part of the year. There being no inspection in Uganda dirty and wet maize purchased there averaged from Sh. 28 to Sh. 36 per bag as against the North Nyanza producer price of Sh. 26 per bag for dry clean maize. It is estimated that 75,000 bags of Kenya maize were exported to Uganda in this way.

The guaranteed free on rail price for Grade II maize from the 1955 crop was Sh. 38/15 per 200 lb. bag without the bag.

Oats.—The actual production of oats from the 1954 planted crop was 154,382 bags (150 lb.) from 21,986 acres an average yield of 7.02 bags an acre. The estimate of production in 1955 was 167,471 bags from 25,983 acres giving an average yield of 6.44 bags an acre. Much of this crop is being used as stock feed, either as grain, hay, or silage.

Other Cereals.—Production of Sorghum, Finger and Foxtail Millets in the African areas is still largely consumed by the growers. In the crop year ending 31st July, 1955, 118,117 bags of these cereals were sold to the Produce Control and of this 95,971 bags (200 lb.) was Finger Millet from Nyanza Province which Produce Control found difficult to sell.

Passion Fruit.—There has been an increase in interest in this crop in Nyanza Province. Total production for 1955 amounted to 3,623 gallons, local sales to 742 gallons, and the number of growers was eleven. The area under crop in the Kericho district amounted to 60 acres in 1955 of which about one-third was in full production.

Potatoes.—A steady increase in acreage took place in the Central Province except in Meru district where much of the former potato-growing area remains closed for security reasons. Long rains crops yielded well in all districts of the Province but short rains plantings in Meru have been severely hit by blight. The popular resistant variety Dutch Robyjin has been affected by the blight in Meru.

Production is also on the increase in Nyanza Province where output in Kericho district has quadrupled since 1950. An experimental plot at Sotik Post on vlei land yielded 12 tons to the acre.

The value of recorded sales from African areas amounted to £95,695 in 1955 compared with £70,427 in 1954. The tonnage was slightly greater in 1955. Exports increased from 687 tons, valued at £14,410, in 1954 to 800 tons, valued at £17,302, in 1955.

There was an increased production of sweet potatoes in the African areas during the year, particularly in Central Province.

Pulses.—The most promising area of Nyanza Province for these crops is in the Sotik Division of Kericho district. Elsewhere in the Province yields are not high. Bean crops were patchy in the Central Province and the Dolichos crop continued to decline except in Meru, which district exported over 11,000 bags.

The recorded quantities of pulses of all kinds marketed from the African areas decreased from 8,775 tons, valued at £147,409, in 1954 to 3,891 tons, valued at £72,219, in 1955. Deliveries to Produce Control in the crop year ending 31st July were:—

	1953/54 *Tons*	*1954/55* *Tons*
Bean, various	7,714	3,284
Field Peas	1,127	30
Cowpeas, grams and other	1,678	2,422
Total ..	10,519	5,736

Exports of pulses decreased from 644 tons valued at £38,174 in 1954 to 645 tons valued at £36,784 in 1955.

Pyrethrum.—The area licensed for 1955 was 19,171 acres compared with 20,987 acres in 1954. Production of dried flowers increased from 2,064 tons in 1954 to 2,679 tons in 1955. Flowers valued at £284,732 and extract valued at £953,746 were exported compared with £334,272 and £570,775 respectively in the previous year.

The acreages grown by Africans in the Central Province are shown below:—

	1954 *Acres*	*1955* *Acres*
Embu	2.50	2.50
South Nyeri ..	297.21	305.28
Fort Hall	35.00	35.00
Kiambu	1,317.69	1,367.69
Total ..	1,652.40	1,710.47

The value of the Central Province crop increased from £38,671 in 1954 to £49,985 in 1955. The value of the African-grown crop also increased in South

Nyanza, where 463 growers produced over 10 tons of flowers realizing an average price of Sh. 1/45 per lb. from 101 acres.

European growers in the Rift Valley Province were affected by the badly distributed rainfall, weeds being a great problem with the shortage of labour. In the Uasin Gishu the licensed acreage remained the same but there was a slight increase in Nakuru. In this Province there is a small acreage in the Elgeyo district and West Suk planted by 20 African farmers.

Rice.—The main producing areas of Nyanza Province are Central and North Nyanza. The quantity of paddy marketed in Nyanza Province increased from 34,675 bags valued at £59,439 in 1954 to 84,186 bags valued at £135,432 in 1955. Deliveries to Produce Control amounted to 6,736 tons of paddy.

In the Coast Province none of the estimated production of 12,000 bags from the Vanga area was offered to Control, the majority finding its way across the border into Tanganyika. In the other main rice-producing area of the Province in the Tana River harvests were poor.

Work on selection of rice varieties for improved quality to meet consumer preference for the quality of Asiatic rice continues and improvements in purity have been achieved in Nyanza.

Sisal.—The area under estate sisal is estimated to be 271,050 acres. Production increased slightly from 34,411 tons in 1954 to 37,950 tons in 1955.

The Machakos African Sisal Scheme had a disappointing year and only 258 tons of fibre were produced for export valued at £5,846. With no shortage of ready cash amongst the Kamba in the district the low prices for sisal have not proved attractive. The portable raspadors are working but suffer from inadequate supervision and the quality of the fibre produced is low, generally due to sheer laziness in washing. Production is about half what is required for economic operation but every effort is being made to boost it.

In the Nyanza Province several raspadors were sold in Central Nyanza on loans from the African District Council. The owners are not doing well largely because they do not compete efficiently with the rope traders despite the fact that they offer a higher price. Interest in the development of the industry has generally declined during the years due to low prices.

Sugar.—The production of white sugar by Miwani Sugar Mills increased from 8,555 tons in 1954 to 12,006 tons in 1955. The Miwani Mills harvested 97,656 tons of cane and bought a further 34,207 tons of cane including 283 tons from Africans. On other sugar cane farms in the Province about 60,000 tons of cane were made into jaggery and a total of approximately 6,500 tons of jaggery has been produced. This compares with only 1,560 tons in 1954 when all jaggery production was theoretically controlled by the Nyanza Farmers' Co-operative Society. It is evident that the Society, which has now been liquidated, was not, in fact, controlling the total production of jaggery.

In the Coast Province the area under cane at Ramisi increased slightly from 7,000 acres in 1954 to 7,197 acres in 1955. The production of white sugar by the Ramisi factory in 1955 was 4,597 tons.

Sunflower.—Actual production from the 1954 crop was 48,523 bags (100 lb.) from 10,605 acres, an average yield of 4.57 bags per acre. Of this production 14,288 bags were retained on farms. The estimate of production from the 1955 crop was 65,994 bags from 14,573 acres, giving an average yield of 4.52 bags an acre. Of the acreage planted 9,268 acres are in the Trans Nzoia and 3,550 in the Uasin Gishu.

Tea.—The area under tea in Nyanza Province increased from 21,803 acres in 1954 to 23,303 acres in 1955. Production increased from 17,389,588 lb. in 1954 to an estimated 19,000,000 lb. for 1955. The value of exports rose from £2,062,654 in 1954 to £2,761,151 in 1955. There are a number of European farmers who supply green leaf to local factories, receiving an average price of 50 to 80 cents per lb.

The scheme for tea-growing by Africans in the Central Province made good progress during the year. In the newly-gazetted tea-growing area of Othayo Division in South Nyeri 86 acres were planted in five blocks, the biggest of which is 36 acres. At the same time 63 acres were planted in the Mathera Division and a small area of 16 acres in Embu district. A Central Province African-Grown Tea Marketing Board has been formed and a factory is to be built at Ragati in the Mathera Division of Nyeri. Two new nurseries have been established, one in the Othayo Division of Nyeri district and the other in Embu district.

Tobacco.—The production of flue-cured tobacco continued on much the same scale as in previous years in the Fort Hall, Embu and Kitui districts. The crop is handled by the East African Tobacco Company who issue seedlings and purchase the green leaf from African growers. Kitui district had very good crops, the first crop being the heaviest ever and the second crop also fairly heavy, amounting to over 700,000 lb. of green leaf. The Central Province crop amounted to 463,222 lb. of green leaf. The average price paid to the grower for green leaf was 7.8 cents per lb. Average yields per acre are low at about 240 lb. of cured leaf or 1,600 lb. of green leaf. Although the quality of the leaf is not very high there is no doubt that better prices would stimulate interest in the crop.

The production of snuff tobacco in the Southern and Central Provinces continued to provide a source of income which is not to be sneezed at. In the Central Province 215,680 lb. reached the markets and realized £15,640.

Vegetables, Fruit and Flowers.—During the year an exact count was made in the Kiambu district of the Central Province of pineapple plants in the ground and this, allowing for approximately 16,000 plants per acre, showed a total of 2,163 acres. This is a much more exact figure than the estimated acreages recorded in previous reports. Deliveries were made to canning factories in Thika, Machakos and Nairobi. Total sales of this fruit declined slightly from 5,272 tons valued at £60,627 in 1954 to 5,050 tons valued at £48,000 in 1955. This decline, though small, is probably not unconnected with the two depressions in the price which were made during the year. 1,300,000 pineapple suckers were exported from Kiambu during the year, realizing £3,259. Over half-a-million of these suckers went to Fort Hall, where every effort is being made to expand the acreage. Supplies of vegetables and fruits into Nairobi from Kiambu were well maintained during the year in spite of difficulties occasioned by the Emergency. 7,141 tons of various types of vegetables were sent into the city from Kiambu—an average of some 20 tons per day. Local sales of vegetables continued in Nyeri district and a considerable expansion in vegetable growing took place in both Embu and Meru with the result that local supplies were plentiful and supplies could be forwarded to Isiolo and Nanyuki. The total sales of vegetables, fruit and flowers from the Central Province amounted to 15,314 tons valued at £213,632 in 1955, representing an increase in value and a decrease in tonnage as compared with 1954. This underlines the greater emphasis now being placed on quality.

In the Southern Province production increased during the year and total recorded sales of vegetables and fruits increased in value from the 1954 figure of £26,030 to £59,977. The value of strawberry crop increased from £2,602 to £3,977 and the onion crop from £2,520 to £5,001 but the biggest increase in value was derived from the sale of various green vegetables.

The principal producing area in the Coast Province is in the Teita Hills, where it is estimated that 1,000 tons of mixed vegetables worth £27,500 were exported and provided as usual an important source of supply for the port of Mombasa. The citrus crop in Kilifi district realized £500 and the banana crop of 12,250 tons was worth £3,400. Quantities of other fruit were produced and consumed locally in the Province.

In Nyanza Province initial plantings of pineapple suckers have been made with material imported from Kiambu.

Wattle.—The Central Province is the principal wattle-growing area in the Colony and production of bark increased from 40,450 tons valued at £587,217 in 1954 to 47,951 tons valued at £560,000 in 1955. Meru district supplied bark again for the first time for several years. In the next six or seven years a steady reduction in export figures from the Central Province is to be expected owing to the depredations of the Emergency. The slashing of young plantations to deny cover to terrorists and the wholesale destruction of more mature plantations to provide building materials for villages are the main causes of the anticipated decline which may prove very costly to the Province. Drastic measures are called for to re-establish the position and at the same time to take advantage of the situation to plant the crop in the most suitable areas and to fit it where possible into the individual farm economy.

Sales of dry bark from the other African areas of the Province amounted to 1,950 tons, made up as follows:—

	Tons
Nyanza Province	450
Rift Valley Province	171
Southern Province	1,188
Coast Province	141

The area under wattle on European farms in 1955 was 76,900 acres, of which by far the largest area was in the Uasin Gishu district.

The following statistics were supplied by the Kenya Wattle Manufacturers' Association:—

	1954 *Tons*	*1955* *Tons*
Purchased from Africans—		
Dry Bark, F.A.Q.	33,813	38,468
Dry Bark, V.G.	3,623	3,794
Green Bark, F.A.Q.	3,069	4,598
Purchased from Europeans—		
Dry Bark, F.A.Q.	8,783	8,499
Dry Bark, V.G.	379	149
Green Bark, F.A.Q.	9,800	11,561
Total production of extract	25,481	30,375
Total export and local sales of extract ..	25,721	33,561
Exportable value (approx.)	£1,769,000	£2,282,000

Actual exports of wattle extract increased from 24,249 tons valued at £1,668,637 in 1954 to 33,223 tons valued at £2,260,853 in 1955. Exports of wattle bark amount to 8,135 tons valued at £265,412 in 1955.

Wheat.—Actual production from the 1954-sown crop amounted to 1,485,499 bags (200 lb.) from 290,963 acres, an average yield of 5.10 bags an acre. 110,543 bags of this crop were retained on farms. Estimates of production for the 1955 crop are disappointing in spite of substantial increases in acreage particularly

in the Uasin Gishu (11,000 acres) and Naivasha (22,000 acres). Owing to the combination of early drought and late excessive rainfall, the high incidence of stem rust, "take all" and Pyrenophora, the overall yield will be less than four bags to the acre. In addition, grades in general are low and a considerable proportion of the crop will be under grade. The guaranteed free on rail price for Grade I wheat from the 1955-sown crop was Sh. 52 per 200 lb. naked.

Livestock Products

Bacon and Lard.—There was a decrease in the total deliveries of pigs to the factories:—

	1954	*1955*
Baconers	40,903	34,742
Porkers	13,259	11,530
Larders	4,453	3,267
Total ..	58,615	49,539

Butter.—Creamery production increased from 9,321,023 lb. in 1954 to 9,902,210 lb. in 1955, of which 6,524,510 lb. were consumed locally and 3,377,700 lb. valued at £513,575 were exported. The average pay-out for Grade I butterfat was Sh. 3/33 per lb.

Cheese.—Production of cheese by the creameries amounted to 939,306 lb. compared with 1,244,627 lb. in 1954.

Eggs.—Sales of eggs from the African areas decreased from 39,000 gross valued at £40,360 in 1954 to 25,400 gross valued at £28,098 in 1955.

Poultry.—Sales of poultry totalled 210,123 birds valued at £44,027 as against 226,938 worth £42,872 in 1954.

Hides and Skins.—Exports of hides and skins decreased from 120,984 cwt. valued at £1,836,576 in 1954 to 100,239 cwt. valued at £1,298,941 in 1955. Details of export were:—

	Cwt.	*Value* £
Cattle hides (shade-dried)	45,505	457,396
Cattle hides (sun-dried)	1,723	12,070
Cattle hides (wet-salted)	23,370	116,565
Calf skins and kips (shade-dried)	164	3,339
Sheep skins and lamb skins (shade-dried) ..	12,444	182,047
Sheep skins and lamb skins (sun-dried) ..	99	905
Goat skins and kid skins (shade-dried) ..	16,034	479,754
Goat skins and kid skins (sun-dried) ..	442	7,410
Total: ..	Cwt. 99,781	£1,259,486

Slaughter Stock.—The following are comparative figures of purchases by the Kenya Meat Commission:—

	1954	*1955*
European-owned cattle and calves ..	48,981	48,653
African cattle	29,710	42,877
European-owned sheep and goats	43,218	44,528
African-owned sheep and goats	105,170	101,641

Wool.—Exports of wool increased from 12,281 centals (100 lb.) valued at £214,530 in 1954 to 13,818 centals valued at £256,908 in 1955.

TABLE C.—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1955

Commodities	Unit	Quantities					Value				
		1939	1952	1953	1954	1955	1939	1952	1953	1954	1955
							£	£	£	£	£
Cattle	Number	—	—	—	650	601	—	—	—	33,493	25,740
Sheep and Goats	,,	—	210	415	304	167	—	315	608	613	605
Bacon and Ham	Cwt.	1,376	24,556	19,851	14,110	4,837	9,080	257,556	223,932	164,300	70,998
Beeswax	,,	1,208	695	1,145	1,227	1,381	5,162	12,767	21,450	25,985	32,766
Butter and Ghee	,,	21,277	23,533	12,584	25,764	30,405	90,659	391,123	239,495	483,572	517,646
Cheese	,,	652	238	137	132	483	2,987	3,419	2,175	2,355	6,070
Hides (shade-dried)	,,	19,245	42,782	55,780	48,208	45,505	53,372	563,613	798,325	665,748	457,396
Skins (sheep and goats) shade-dried	,,	337,082	19,982	25,623	25,949	28,480	18,152	389,099	565,151	609,005	661,801
Hides (sun-dried)	,,	21,737	2,450	2,954	1,828	1,723	43,444	29,611	29,170	16,847	12,070
Skins (sheep and goats) sun-dried	,,	1,014,543	1,863	1,664	825	542	40,900	24,878	24,861	13,348	8,315
Other Hides and Skins	,,	—	6,563	13,447	10,686	23,989	—	57,575	151,319	81,343	159,359
Wool	Centals of 100 lb.	15,114	12,024	14,543	12,281	13,818	56,578	240,689	257,100	214,530	256,908
Crop Produce—											
Coconuts and Copra	Ton	215	260	1,880	52	645	1,561	5,169	151,580	1,193	34,865
Coffee	Cwt.	338,125	338,441	295,795	216,126	388,468	800,827	7,123,360	6,712,733	5,726,824	8,926,908
Cotton	Centals of 100 lb.	59,677	60,505	42,231	61,002	52,249	124,021	1,098,271	511,972	796,041	691,649
Sisal	Ton	29,163	35,273	35,334	32,232	33,502	442,434	4,469,588	2,482,469	2,041,563	1,958,631
Flax	,,	16	42	87	22	9	810	8,240	13,333	3,341	1,296
Beans and Peas	Cwt.	123,002	151,035	42,991	12,873	12,891	40,250	254,627	73,804	38,174	36,784
Maize	,,	1,007,125	1,365,478	215,043	918,332	1,543,033	222,037	2,385,264	306,017	1,013,192	1,665,422
Maize Meal and Flour	,,	122,029	28,353	34,419	5,602	12,553	25,450	36,801	48,367	8,182	17,107
Pulses other than Beans	,,	7,756	30,611	5,944	—	—	2,702	64,035	20,643	—	—
Wheat	,,	973	147,869	5	—	—	393	281,949	11	—	—
Wheat Flour	,,	63,883	269,037	223,364	103,169	15,270	50,655	647,735	573,545	269,096	40,697
Grain, other than Maize and Wheat	,,	14,618	6,811	180	29,994	18,162	4,424	7,223	533	18,388	29,317
Groundnuts	Ton	402	6	5	28	¼	4,442	403	242	1,317	56
Cashew Nuts	,,	32	40	71	925	1,094	1,812	14,005	21,143	21,437	49,045
Castor Seed	,,	—	5,440	4,600	6,267	4,905	—	392,463	266,721	253,190	195,653
Sunflower Seed	,,	477	4,446	1,496	2,570	1,221	3,997	183,319	65,283	88,925	54,288
Coconut Oil	Cwt.	33,152	278	43	23	693	2,346	2,371	298	177	3,461
Essential Oils	,,	3,660	526	767	619	1,013	4,956	35,794	30,114	29,896	41,312
Groundnut Oils	,,	6,233	—	—	226	—	680	—	—	1,582	—

TABLE C.—QUANTITIES AND VALUES OF EXPORTS OF KENYA PRODUCTS, 1955—(*Contd.*)

Commodities	Unit	Quantities					Value				
		1939	1952	1953	1954	1955	1939	1952	1953	1954	1955
							£	£	£	£	£
Crop Produce—(*Contd.*)											
Sesame Oil	Cwt.	89,944	—	—	136	280	10,008	—	—	872	1,946
Potatoes	,,	173,046	26,216	21,011	13,735	16,000	29,199	24,353	18,200	14,410	17,302
Pyrethrum	,,	55,628	37,863	26,301	23,129	18,553	357,170	511,971	395,852	334,272	284,732
Sugar	,,	81,463	860	521	1,592	440	50,308	2,800	1,438	4,957	1,376
Tea	,,	88,627	85,579	59,925	96,800	115,572	501,732	1,315,803	928,276	2,062,654	2,761,151
Wattle Bark	,,	226,716	2,077	36,100	135,831	162,713	72,846	61,034	58,591	219,979	265,412
Wattle Bark Extract	,,	131,312	480,488	441,828	484,085	664,465	91,439	1,685,912	1,544,720	1,668,037	2,260,853
Passion Fruit Juice	,,	22,744	9,449	—	—	—	6,713	5,833	—	—	—
Pyrethrum Extract	,,	—	—	—	1,483	2,443	—	—	—	570,775	953,746
Other Agricultural Produce	,,	—	—	—	—	—	54,446	163,509	178,796	323,628	193,414
Total		—	—	—	—	—	3,242,495	22,752,477	16,718,264	17,823,241	22,696,097

TABLE D.—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETED FROM THE AFRICAN AREAS (PARTLY ESTIMATED)

Produce	Unit	Nyanza Province		Central Province		Southern Province		Coast Province	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
			£		£		£		£
Bananas	Ton	—	—	632	11,540	—	—	1,250	3,400
Beeswax	36 lb.	—	—	359	1,570	462	3,089	—	—
Cashew Nuts	Ton	—	—	—	—	—	—	1,522	34,099
Cassava	,,	590	5,440	—	—	—	—	96½	865
Chillies	,,	—	—	—	—	—	—	303	17,717
Coffee (parchment)	,,	90	36,577	916	257,621	—	—	6	1,800
Copra	36 lb.	buni 117	13,179	(inc. buni)				buni 4	600
		—	—	—	—	—	—	39,261	29,445
								6,000,000 nuts	60,000
Coriander	180 lb.	—	—	—	—	953	1,929	—	—
Castor Seed	180 lb.	—	—	—	—	41,468	11,971	1,159	4,036
Cotton Lint	400 lb.	38,208	330,837	—	—	—	—	6,408	66,114
Eggs	Number	2,024,684	12,461	1,221,600	12,213	409,149	3,424	—	—
Charcoal, Fuel, Poles	—	—	—	—	417,070	—	—	—	—
Ghee	36 lb.	32,829	156,350	—	—	—	—	—	—
Groundnuts	180 lb.	21,928	78,928	—	—	—	—	—	—
Hides	Number	81,059	50,270*	89,340	90,000	297,938	—	33,391	—
Kapok	lb.	—	—	—	—	—	—	129,550	4,534
Maize and Maize Meal	200 lb.	992,491	1,400,291	22,567	27,757	3,299	No figs.	9,638	12,696
Millets and Sorghum	200 lb.		219,132	1,414	1,607	97	194	—	—
Miraa (*catha edulis*)	Bundles	106,575	—	272,635	136,317	—	—	—	—
Potatoes (English)	180 lb.	—	19,325*	55,802	81,370	4,635	No figs.	—	—
Poultry	Head	Figs. not complete	3,063	34,879	6,976	—	—	—	—
Pulses	200 lb.	14,322	7,520	29,770	56,242	4,994	8,357†	211	844
		3,949							

*Estimate.

†Figures incomplete.

TABLE D.—QUANTITIES AND VALUES OF MORE IMPORTANT PRODUCTS MARKETED FROM THE AFRICAN AREAS (PARTLY ESTIMATED)—(*Contd.*)

Produce	Unit	Nyanza Province		Central Province		Southern Province		Coast Province	
		Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
			£		£		£		£
Pyrethrum	lb.	24,317	1,775	487,478	49,985	160,922	33,988	—	—
Rice (Paddy)	150 lb.	84,186	135,432	—	—	—	—	740	8,140
Sesame	180 lb.	—	—	—	—	—	—	250	900
Sisal Leaf	Ton	—	—	—	—	258	5,846†	—	—
Sisal Fibre									
Skins	Score	153,752	30,766*	459,316	112,744	14,897	46,588	—	—
Tobacco, green leaf	lb.	—	—	—	—	—	—	—	—
Tobacco, native cured	,,	—	—	215,680	15,640	—	—	—	—
Vegetables, Flowers and Fruit	,,	—	—	—	39,092	—	59,977	—	28,000
Wattle Bark	Ton	450	5,096	47,951	560,000	1,188	18,452	141	1,750
Total Value, 1955 ..			2,506,442*		1,877,744		274,940†		327,206
Total Value, 1954 ..			2,728,173		1,820,314		327,289		504,969

*Estimate. †Figures incomplete.

PART II—RESEARCH AND SPECIALIST SERVICES

(Note.—The information that follows is merely a summary of the work of the Research Division during 1955. *The reports of individual research officers and the detailed results of experiments are published later in Volume II of this Report, under the title* Record of Investigations.)

The research facilities of the Department were expanded considerably during 1955 with funds provided under the Colony's 3½-year Development Plan and the Swynnerton Plan for the intensified development of agriculture in the African areas.

In the grounds of the new Scott Agricultural Laboratories in Nairobi, ten houses were built to accommodate members of the staff. At the Coffee Research Station, Ruiru, extensions were made to the office, laboratories, farm buildings and factory. At the Plant Breeding Station, Njoro, two staff houses were built and plans for the new laboratory building were finalized. Under Grassland Research, development of the main station at Kitale proceeded with the construction of houses for European and African staff, labour lines, farm buildings and the purchase of equipment. A similar development took place at the high-altitude sub-station at Marindas, near Molo, where more land is being brought into use, livestock purchased and experimental work started on crops other than grass.

For the expansion of general investigational work in the African areas, including the introduction of the use of fertilizers into African agriculture, seven officers were appointed to Kakamega, Embu, Machakos and Makueni. A farm was bought at Katumani, near Machakos, to provide an experimental station for the Southern Province for pasture research in the drier African areas, breeding work on sorghum and short-term maize, fertilizer trials and general agronomic experiments. The development was begun of a new horticultural station at Thika, primarily for research work on pineapples. Development was also begun of an irrigation experimental station at Mwea near Embu. Two officers were trained to undertake experimental work on coffee in the African areas.

During the year the staff of research officers increased from 34 to 41 and a further nine officers recruited were undergoing special training. The number of other European staff in the Research Division increased slightly from 57 to 60, the total European establishment of the Division at the end of the year being 101.

General Husbandry

African Areas

In areas suitable for mixed farming, which are potentially the most productive part of the African lands, much work has been done on the establishment and management of leys and on the production of dry season fodder. For those areas that enjoy a reasonably good rainfall, Rhodes grass, Molasses grass, Star grass and the Nandi strain of *Setaria sphacelata* have proved to be satisfactory ley species. In the 1955 work in Nyanza Province Nandi *Setaria* was shown to be the most persistent of these grasses and Kenya White Clover (*Trifolium semipilosum*) was the most promising legume. In this year Kenya White Clover competed strongly with the grasses and was at times embarrassing in its luxuriance. In the drier areas, great difficulty was experienced in establishing seeded grasses and, once established, their persistence was disappointing. Vegetatively propagated grasses such as *Panicum makarikariensis* and Star grass gave the best results under these dry conditions. In the Star grass zone of Central Province, it was observed that the natural grasses that come in following the clearing of secondary bush are highly productive for the first year or two but after that there was a sharp decline in productivity and a decrease in the proportion of desirable grass

species. There is some evidence that this decline is due to a deficiency of soil phosphate and perhaps to a deficiency of nitrogen as well. At the Coast, where work on grassland is still at an early stage, *Panicum makarikariensis* has been shown to be a reliable grass species on the Magarini sands and the legume *Stylosanthes gracilis* has proved outstanding in the Shimba Hills. Among the many crops under trial as producers of green fodder for the dry season, the Uganda hairless strain of Elephant grass (*Pennisetum purpureum*) was still by far the heaviest yielder.

After the work on leys, designed to facilitate the introduction of alternate husbandry, the most important investigations in the African areas were concerned with the possibility of increasing the yields of arable crops by the use of farmyard manure and fertilizers. That profitable increases in yield can be obtained from applications of phosphate has already been proved over large areas of the North Nyanza district. In 1955 experiments were continued to determine the optimum rates and frequencies of application of phosphate and farmyard manure and exploratory fertilizer trials were extended in the Central, Southern and Coast Provinces. Results at Embu in Central Province emphasized the necessity for a combination of farmyard manure and phosphate in order to obtain the highest yields, thus the yield of maize on land regularly dressed with farmyard manure was increased by more than three bags an acre when phosphate was applied. Conversely, there was sound experimental evidence that in dry areas and on poor sandy soils applications of phosphate were of little value in the absence of farmyard manure. In the Shimba Hills in the Coast Province, it was shown that successful farming is not possible without the application of phosphate but that a dressing of one cwt. of double superphosphate to the acre was sufficient to correct the deficiency. In the experiments on rates and times of application of farmyard manure it was shown that the effect of an initial dressing of 10 tons per acre disappeared in three to four years and that annual dressings of three tons per acre over a period of three years were more profitable than the equivalent amount in one application at the beginning. In another experiment it was shown that yields of arable crops could be maintained satisfactorily for four years by annual importations of mulch.

Work on the selection of improved varieties of African food crops continued, particularly in Nyanza Province, where 170 varieties of sorghum and 75 varieties of groundnuts were grown in observation plots. The more promising of these were tested in variety trials which showed that two white grained varieties of Dobbs Sorghum significantly outyielded the others. Similarly, in the groundnut trials two varieties were outstanding, one of which was the type grown by African farmers in the Homa Bay area. In the Central Province further work was done on rice and other crops in connexion with the Mwea-Tebere irrigation scheme. Over 60 varieties of rice were studied in initial trials and information was collected on planting times and methods, cultural practices and fertilizer requirements. In the Coast Province the variety of cassava 46106/27, which has proved to be both disease resistant and high yielding, was distributed to farmers to replace the local types. Four other very promising varieties are available should the necessity for their introduction arise.

Experimental work on the cotton crop was continued in Nyanza Province by an officer of the Empire Cotton Growing Corporation and by an entomologist of the Kenya Department of Agriculture. The work included variety trials, manurial trials, a study of cultivation methods, and particularly the control of insect pests which are a major factor limiting cotton production in the Province. At the Coast further cotton variety trials confirmed the suitability of both UK. 48 and S. 47 for Coast conditions, with UK. 48 holding a slight advantage over S. 47 in yield and resistance to Jassid damage. A study of the local custom of inter-

planting cotton and maize showed that the maize had little effect on the cotton crops and that the yield of maize obtained was dependent on the timeliness of planting. A mixed crop of cotton and groundnuts was shown to be more profitable than growing these crops in pure stands and the crop that benefited in this association was the cotton.

Special attention was again given to the problem of the most effective use of the extensive bracken-covered areas in the Central Province. Eighty acres of land at Kanja in the Embu district were obtained and prepared for experimental work on this problem. The climate of the bracken zone is suitable for dairying yet productive natural pasture does not exist. Earlier work showed that the soils are deficient in lime and phosphate and that both crops and grass respond to dressings of farmyard manure. Pastures of Kikuyu grass, Molasses grass and Guinea grass were successfully established with the aid of phosphate and farmyard manure and they have now remained productive over a period of three years. Soil analyses and laboratory trials have been made in preparation for more comprehensive field experiments in 1956.

European Areas

Experimental work was carried out at Eldoret (altitude 7,000 ft.), Ol Joro Orok (7,800 ft.), Kitale (6,200 ft.), and the Kinangop (8,000 ft.); on Departmental plots at Rongai (6,100 ft.) and Njoro (7,100 ft.) and on farms at Londiani, Kampiya-Moto, Elburgon and Mau Narok. Much of this work comprised ley establishment trials and cereal variety trials which are mentioned later under the headings Grassland and Plant Breeding, respectively.

Trials of interplanting maize with various legumes were started with the object of increasing the value of the stover grazing or silage crop. So far indications are that if the legume is planted after the last cultivation there is little, if any, reduction in the maize yield.

Long-term fertilizer trials were continued at Eldoret and Ol Joro Orok to test the residual effects of double superphosphate, soda phosphate and Uganda rock phosphate applied over one, two and three years. At Eldoret there was no significant difference between the effect of double superphosphate and soda phosphate both applied over one or over three years, but in all cases the residual effect of Uganda phosphate was significantly lower than that of the other two types. Applied over two years, double superphosphate gave a significantly greater response than either of the other two types applied over the same period. Long-term liming studies on the more acid soils of the Highlands were continued at Eldoret, Kaptagat, Molo and on the Kinangop.

Drainage trials were continued at Ol Joro Orok and Londiani. At Ol Joro Orok ridge and furrow trials are to be abandoned and more attention paid to mole draining, tile draining and ditching. At Londiani mole drains have remained in good condition over five years and their effect resulted in an increased wheat yield of approximately $1\frac{3}{4}$ bags per acre.

Feeding trials have continued at Ol Joro Orok with Borgan x Angus, Boran x Red Poll and Boran steers: the more rapid maturity of the cross-bred steers is already noticeable. On farms in the Nakuru district co-operative feeding experiments have been conducted on supplementary rations with copper sulphate and phosphates. In general, phosphate in the form of bonemeal had the effect of prolonging the lactation.

In a pig-feeding trial at Kitale to compare indoor feeding against outdoor feeding on a ley, and *ad lib.* feeding against controlled feeding, it was shown that better food conversion ratios were obtained in those groups on a ley, e.g.,

2.11:1. Grading was poorer within the outdoor group but it may be possible to improve this by marketing the pigs earlier. The trial also showed that reasonably good gradings can be obtained using rations consisting mainly of maize.

Grassland

The rainfall for the year at Kitale main station was 40.72 in., the distribution being on the light side in the first half of the growing season and above average for the last three months.

Apart from the main station at Kitale (altitude 6,200 ft.), and the sub-station at Molo (9,000 ft.), two new sub-stations are being opened in the semi-arid African areas. Their function is to deal with: (*a*) management of natural grassland, (*b*) revegetation of denuded areas, (*c*) bush control, and (*d*) establishment and management of leys under marginal conditions, (*e*) seed production of grasses required for these areas.

The plant introduction and nursery work at Kitale has brought in new and useful plant material and 260 new plots were planted up. Among new arrivals, some varieties of Rhodes grass were particularly good. After nearly five years of plant introduction work it is becoming apparent that the main species in general use are not very likely to be replaced by entirely new ones though they may eventually be supplemented by a few new species. The genus *Paspalum* seems to be the most promising source of new grass species at present. The work with leguminous plants continues and a collection of over thirty varieties of Kenya White Clover (*Trifolium semipilosum*) has been assembled and is being scrutinized. The qualities required are disease resistance, productivity, good seed production and drought resistance. Several of these varieties have now been selected for more critical trials. An imported clover variety, Louisiana White Clover (*Trifolium repens*), also shows promise and it being tested on a wider scale. The Lucerne collection now numbers over 120 varieties and a number of these which have been sorted out for further comparison show less susceptibility to leaf diseases and also greater productivity. A swamp nursery has also been started in which to examine species suitable for swampy ground and seasonally waterlogged soils.

Production of seed of the more promising grasses and legumes has been carried out and 90 varieties were grown for seed on 35 acres. The main ones were Nandi *Setaria, Trifolium semipilosum, T. rueppellianum* and a perennial variety of *Dolichos lablab*. There is now an adequate supply of seed for widespread trials of these species at agricultural stations.

In the preliminary trials, which are used to eliminate species or varieties which are unable to withstand intensive grazing, Kenya White Clover was sown with 21 varieties of Molasses grass and with nine varieties of Rhodes grass. The clover sown at 4 lb. to the acre, under the prevailing conditions and management, proved too aggressive for most of the grass varieties. The best varieties of Molasses grass were ones from Kitale, U.S.A., Hoey's Bridge and Nigeria, while the best Rhodes grass varieties were from Mbarara, Chepararia, Lumbwa, Endebess and Kitale. When the best of these varieties have been selected, they will come into the Colony seed certification scheme so that certified seed will be available to farmers as soon as possible. A pilot scheme for the production of certified seed of Nandi *Setaria* has been started. While the Grassland Station can easily produce the necessary amount of foundation seed, some difficulty has been experienced in arranging for the production of mother seed under adequate control and supervision.

The herbage agronomy work on the station has been concerned with the further evaluation of species and strains for leys and work on ley establishment

and management. Experience indicates that we have four main kinds of leys in use, which are as follows: (i) General purpose leys: these, apart from natural grassland, provide the main source of grazing during the rainy season. The most important species for this purpose are Rhodes grass (*Chloris gayana*), Molasses grass (*Melinis minutiflora*), Nandi *Setaria* (*Setaria sphacetata*) and Star grass (*Cynodon dactylon*), and among legumes, Lucerne and Kenya White Clover (*Tifolium semipilosum*). While these are primarily intended for grazing, they are also equally suitable for silage in the flush season or for hay later on. (ii) Special season leys: these consist of a grass such as Nandi *Setaria* in alternate rows about 2 ft. apart with Lucerne, and may be cultivated occasionally. Such leys are able to produce high quality feed when the ordinary grass ley has gone off in quality and production, having become too fibrous and lignified. (iii) Dry season leys: these are maintained for the production of green fodder in the dry season, and the main constituents are Elephant grass (*Pennisetum purpureum*), Guinea grass (*Panicum maximum*) and *Setaria splendida,* together with certain perennial legumes under trial which still require further selection. (iv) Seed production leys: these are managed with a view to maximum seed production and include leys consisting of Rhodes grass, Molasses grass and Nandi *Setaria*. Though we have information on the fertilizers necessary for seed production, there is little knowledge available concerning the management of such leys.

Work done on the problem of ley establishment by undersowing in the last crop of wheat or maize indicates that very good results can be obtained by this method. The same holds true when the grass is established with a grazing companion crop such as oats or sweet lupins. Establishment of the grass alone without a grazing companion crop, although equally successful, seems to have very limited application owing to the low production in the first part of the season and greater incidence of weeds.

An experiment on the management of a Rhodes grass ley has produced useful results in comparing the production obtained by managing it for hay, grazing, silage and seed production. The respective mean yields for the treatments, in terms of dry matter per acre per annum, were: 3 tons 19 cwt., 4 tons 17 cwt., 5 tons 6 cwt., 4 tons 2 cwt. In the hay and silage treatments the grass is now becoming unproductive and dying out in patches which are becoming invaded by annual weeds. The experiment will continue for another year and then be followed by test crops. The general effect of the treatments is however already apparent.

Another experiment, on the production of green fodder during the dry season of 1955, indicates the amount of dry matter per acre obtained in one cut from various fodder grasses. This is in addition to the yield during the rainy season—

	Tons dry matter per acre.	
	Tons	*Cwts.*
Beckeropsis uniseta		18½
Elephant grass (hairless)	1	1½
Guinea grass	1	7½
Perennial *sorghum*		6½
Setaria splendida	2	6
Hyparrhenia hirta	1	8

Other experiments on ley management have not produced any firm results to date and a number of new problems have arisen. While the management of a single species grass ley is not a difficult undertaking, the management of a mixed grass-legume ley under tropical conditions is more complicated because the grass-legume balance is affected by moisture relations, plant population, compatability, and by the effect of the mowing machine, fertilizers and the grazing system.

The work on grass seed production confirms the results obtained last year, that Nzoia Rhodes grass planted in wide cultivated rows does much better than in broadcast stands and that fertilizer dressings of the order of 1 cwt. of double superphosphate plus 2 cwt. of sulphate of ammonia per acre gives substantial increases in the yield of seed. In the case of Rhodes grass, harvests at the rate of over 4 cwt. of seed per acre have been obtained. One of the lighter seeders among our potential ley grasses is thin-stemmed Guinea grass (*Panicum maximum* var. *trichoglume*). By the use of a combined dressing of nitrogen at 3 cwt. per acre, phosphorus at 2 cwt. per acre and potash at 1 cwt. per acre, and three harvests, a pure seed yield of 193 lb. per acre was obtained. However, more work is still necessary to ensure adequate establishment of this species.

Experiments on nitrogen fixation by pasture legumes have been continued and evidence continues to accumulate from field experiments that a number of species do, in fact, fix nitrogen. Subterranean clover has shown the most striking results in this respect. The next stage is to ascertain the conditions necessary to enable the grass to benefit from the clover or legume growing with it.

At Molo, the legume which is being tested for pasture purposes is the local purple-flowered *Trifolium johnstonii*. A fertilizer experiment on this species has shown significant responses to lime and phosphate, particularly the latter. Similar results were obtained in the fertilizer experiment on Lucerne.

In the vlei nursery, a large number of herbage plants were grown with and without lime. The Cocksfoot, Rye grass and Timothy varieties were best when limed and on the unlimed plots the only ones which appeared at all suitable were Italian Rye grass and Yorkshire Fog. Legumes were disappointing in their response to lime except for *Trifolium johnstonii* and *T. semipilosum*.

The Pasture Research Chemist and his staff have done a lot of routine analytical work and have carried out special investigations on the crude fibre content of plant materials at altitudes appreciably above sea level, the seasonal variation in the composition of Nandi *Setaria* and the feeding value of various fodder shrubs and herbs.

During 1955 members of the staff of the Grassland Research Station published the results of some of their work in papers on crude fibre estimation, the germination of some Kenya weeds, fertilizers for ley establishment, plant introduction work at Kitale, forage legumes for medium altitudes, the management and utilization of leys, and the management of permanent pasture.

Coffee

Entomology.—Work has continued on the control of Leafminer (*Leucoptera coffeella* Guer. and *L. caffeina* Washb.). Sprays of organo-phosphorus insecticides have been tried and of these Diazinon has shown the most promise, although further work is needed.

The Coffee Berry Moth (*Thliptoceras octoguttale* Feld.) was more prevalent than usual, probably owing to the heavy crop and certain climatic factors. The damage done by this insect was occasionally more serious than usual, but it did not become a pest of major importance.

Leaf-eating caterpillars (*Parasa vivida* Walk., and *Niphadolepis alianta* Kersch.) damaged coffee foliage in the Central Province during the first half of the year. Control of outbreaks was achieved by D.D.T. spraying or dusting. Pyrethrum powder dust was found effective on *P. vivida* at a rate as low as 4–5 lb. per acre. Control of an outbreak of *N. alianta* in the Donyo Sabuk district was achieved by dusting a 5 per cent D.D.T. dust at a rate of 30 lb. per acre.

Coffee Thrips (*Diarthrothrips coffeæ* Williams): No widespread outbreak of thrips occurred, but control measures were taken on many estates in the Ruiru-Thika area. Diazinon 60 per cent emulsion concentrate was tested against thrips and gave control at concentrations as low as 1 part of the concentrate to 3,000 of water. As this insecticide is not persistent, the populations rose again to large numbers about six days after spraying.

Serious outbreaks of Antestia (*Antestiopsis lineaticollis* Stal., and *A. faceta* germ) occurred in the Central Province in the latter part of the year. The heavy crop undoubtedly provided abundant food material for the insects and breeding occurred at a rapid rate.

Experiments against Antestia with various pyrethrum dust formulations showed that a dust made up of 80 per cent ground limestone and 20 per cent pyrethrum marc, containing 0.2 per cent pyrethrins and 2 per cent piperonyl butoxide, was as effective as the pyrethrum powder normally used which contains more than 1 per cent pyrethrins.

Experiments using an air-blast, medium volume, tractor-drawn machine showed that emulsions of pyrethrum extract were not effective against Antestia when applied in this way. Alteration of droplet size may, however, overcome this characteristic.

White Borer (*Anthores leuconotus* Pasc.). An experiment was started in Makuyu using the dieldrin spray-banding technique used against this insect in Tanganyika. The aim of this experiment is to evaluate the effectiveness of the method under Kenya conditions.

Field Trials.—Tillage investigations: Research into the problem of tillage and weed control was begun in 1947 and the results from the first seven years' work were reported in two papers published in the *Empire Journal of Experimental Agriculture* during 1954. The outcome of this research was the development of a tractor-powered rotary hoe to control weed growth and leave a cloddy tilth similar to that produced by the hand fork. The initial field tests of this implement were regarded as highly satisfactory, sufficiently so to justify its widespread adoption into practice on estates situated on the Kikuyu red loam soils. Subsequent trials during the past two years have fully endorsed the earlier tests: the effect of the new implement on rainfall percolation and on tree yields has compared favourably with the hand fork when used to control weeds during and at the end of the rainy seasons.

Moreover, the cultivation trial, upon which the above recommendations were founded, during the second cycle has continued to confirm the conclusions derived during the first cycle of multiple-stem pruning. These are, namely, that weeds left uncontrolled or partially controlled during the rains greatly depressed crop yields; that the hand fork caused less degradation of soil structure than the tractor-drawn disc harrow or plough and led to higher yields when used for intra-rains weed control.

Manurial and mulch trials: From the five trials at Ruiru, in which nitrogen dressings are tested, the pattern of response to nitrogen is clarifying as the trials progress. Sulphate of ammonia, applied at 2 to 4 cwt. per acre, usually gives a response in three out of every four years. There is as yet no evidence to show if it is best applied during the long or short rains, or in both. The question of whether sulphate of ammonia should be applied to bare or mulched soil, when both are in conjunction, has been the subject of trial for two years; during this short period there have been indications that an improved effect is obtained by applying it to bare soil within the root range of the tree.

Over the course of six years there have been no improvements in yield due to heavy dressings of farmyard manure or phosphate, but smaller dressings of farmyard manure have produced an increase in yield from multiple-stem trees which has been reversed in the following year.

In the mulch trial, grass mulching caused heavy increases in yield which were offset to some extent by lighter cropping in the following year. In other trials, however, mulch has produced useful increases in yield.

In both 1954 and 1955, nitrate of soda increased yield appreciably, whereas sulphate of ammonia was effective only in the latter year. In this year there was a negative interaction of nitrogen with mulch, as in 1951, when nitrogen increased yields only in the absence of mulch. In 1951, however, mulching alone increased yields substantially.

Tonic copper spraying: Yield responses of a very high order were obtained during the second year of the trial in which air-blast and standard high-volume spraying are compared. No significant differences in yield could be detected between the four rates and concentrations of copper fungicide applied by the air-blast machine nor was there any apparent yield difference between this method and the high-volume spray at standard rate and strength. All spraying treatments, however, increased yield by more than 300 per cent over the unsprayed controls, a remarkable response at any time, but even more so in view of the very light crop and absence of crop strain in 1954.

During the second year of spraying in the small "tonic" spray trial at Makuyu, yield variability was high and this undoubtedly masked inter-treatment effects. A significant increase in yield was obtained from only one time of spraying, i.e. when applied late in the long rains tonic spraying caused a substantial increase in yield.

Pathology and Physiology.—While investigations on problems concerned with anti-leaf fall spraying have continued to receive the most attention during the year, it was found necessary to devote a considerable amount of time to Coffee Berry Disease and Leaf Rust. Further, the number of minor investigations of an *ad hoc* nature required this year has been higher than usual.

The Solai trial of time of anti-leaf fall spraying, concentrations and rates, received its last spray applications but yields will continue to be recorded until the end of the 1956 cropping year. The 1954/55 crop showed only effects due to timing, the unsprayed coffee yielding significantly less than that which had been sprayed in May or September. The July spraying again gave less response than the May or September sprayings. Over the four years the experiment has run, July spraying has shown some response as against no spraying, but significantly less than either May or September spraying.

The 1954/55 crop from the trial at Kitale, which is similar in design to the Solai trial, showed a reversal of last year's effects, in that the September application showed somewhat higher yields than the May and July sprayings, but this is an expected result from the third crop following the commencement of a spray trial.

The field trial at the Coffee Research Station which tests the effects of non-copper and copper sprays on leaf fall and yield produced its first recorded crop at the end of this year. So far only cherry weights are available, but these show that the frequent application of a non-copper fungicide, Fernide, during the rains, has produced as good a crop response as the normal copper fungicide application in May. It may be inferred that copper anti-leaf fall sprays act entirely through their fungicidal action and not through any mechanism specifically due to their

copper content. Dusting with a copper fungicide produced a significantly higher yield than control, but less, though not significantly so, than copper spraying. Two copper sprays a year, the second applied previous to the short rains, produced a small but significantly greater response than one spray only in May. Spraying with alpha-naphthalene acetic acid (a plant hormone) produced a small, non-significant response as against control. These results are very similar to those observed last year for the effects on leaf fall. This year the effects on leaf fall have, in general, resembled those of last year, with the exception that the hormone spraying may have had some control over early leaf fall.

The results of the 1954 trial of types of spray and concentration on leaf fall were difficult to interpret and the effects of concentrations did not reach significance, although there was a tendency for the 42-oz. in 40-gal. rate to produce less leaf fall than the 21- or 64-oz. rate. In view of this a further experiment of a similar design was carried out during 1955, and the yields of the 1954 experiment have been recorded this year. However, until more definite results are obtained, it has been recommended that the 42-oz. rate should be used for all types of 50 per cent copper formulations.

A further attempt to solve the question of whether anti-leaf fall sprays are more effective on the upper or lower surfaces, this time using spraying as against painting, has shown that, whereas a considerable effect can be produced by upper surface spraying alone, a spray directed at the lower surface appeared to be more efficient.

Two experiments were carried out to test the relative cover produced by different types of tractor-drawn spraying machines. It was concluded that 30 gal. per acre applied by air-blast machines gave an equal or better cover than 1 pint per tree applied by hand, or 120 gal. per acre with a high-volume sprayer. Investigations of a reported case of poor cover being obtained with air-blast spraying appeared to indicate that either wind or very thin leafage may have been responsible.

Tests of cover produced by aerial spraying, although at first encouraging, indicated that it is not possible to rely on getting more than a very poor underleaf cover with present methods.

As special staff to investigate Coffee Berry Disease were still unavailable at the beginning of the year, it was felt that further investigations should be undertaken in their absence. In consequence, a large trial incorporating 15 different fungicidal treatments was commenced in Upper Kiambu. Fungicides included were Perenox, Karathane, Verdasan, Fermate, Zerlate, Dithane, Actidione, Captan, Glyoxalidine and Calcium sulphamate. The results of this trial have been very encouraging in that one of the fungicides, Verdasan (phenyl mercury acetate) has exerted considerable control over the disease. None of the other fungicides have shown much effect when applied at monthly intervals during the rains. Perenox applied at fortnightly intervals, however, did show considerable control.

In May, Mr. K. Bock was appointed Scientific Assistant in the team to investigate Coffee Berry Disease. In the absence of other members of the team, he worked under Mr. Rayner's direction until the end of the year. He continued the field investigations already commenced and also carried out investigations on inoculation techniques, germination and penetration of the fungus, and the effects of fungicides, temperature, etc., on these. Dr. Nutman and Dr. Roberts were finally appointed to carry out further research on the disease and arrived at the end of the year.

The epidemiology of Leaf Rust has been studied with special reference to the interrelation of infective weather conditions, build-up of infection in the field, and incubation periods.

The Maleic hydrazide trial at Cherangani near Kitale was continued. The first crop since the first sprayings were carried out showed no effects on yield. The effects on growth have been considerable, especially at the high (0.6 per cent) concentration and effects on the 1955/56 crop are expected.

Growth recording at the Scott Laboratories and at the Coffee Research Station continues and at the latter the artificial shade treatment has now been applied.

A range of minor investigations have been carried out in connexion with queries from planters. These include Elgon Die-back, flower-bud abortion, lightening damage, root rot, accidental chemical ring barking, suberisation of berries, embryo death in coffee beans, damping-off of coffee seedlings, and intermittent chlorosis.

Agricultural Chemistry.—In the investigation programme into soil nitrogen and the nitrogen nutrition of coffee, a short-term study of nitrogen mineralization trends in the upper 2-ft. zone of a typical coffee soil (Kikuyu red loam, laterite) was concluded in May, 1955. A large quantity of data on soil nitrate, ammonia and soil moisture was collected, and this was examined statistically. The results showed: (*a*) A significantly higher average level of nitrate nitrogen under coffee pruned on the multiple-stem as against the single-stem system during the period of sampling (March, 1954–May, 1955); the ammonia nitrogen level was also higher but not significantly so. (*b*) A very substantial and significant mean difference in nitrate nitrogen levels between the 0–3-in. interval and the remaining depth intervals to 2 ft.; a similar difference was apparent for the ammonia nitrogen. (*c*) The relationship of general trends and fluctuations of nitrate and ammonia nitrogen with rainfall and soil moisture. (*d*) The accumulation of ammonia nitrogen that takes place when the soil moisture content falls below the minimum level at which active nitrate nitrogen formation occurs.

Significant interaction differences of nitrate nitrogen occurred with successive sampling intervals under single- and multiple-stem pruned coffee. Nitrate nitrogen interactions with sample depth and sampling intervals, when considered in relation to soil moisture data, rainfall and gypsum block records, provide interesting suggestions that upward as well as downward movement occurs within the top 2 ft. of soil under differing soil moisture conditions.

Some laboratory investigations of nitrogen mineralization in the immediate topsoil of this same soil type, to define the relationships between soil moisture and the formation of nitrate and ammonia nitrogen, have provided data of considerable interest and assistance in interpreting the results from the previous field study. Soil moisture content was adjusted for standard laboratory incubation tests, in relation to the field capacity and wilting point soil moisture levels. Nitrate nitrogen values at the end of a 32-day period increased as expected with increasing soil moisture levels above wilting point. Nitrate nitrogen was also produced, and it accumulated, at the level of wilting point soil moisture content, but at five-sixths wilting point moisture content and below no significant degree of nitrate nitrogen production occurred. Ammonia nitrogen showed reverse trends at soil moisture levels of wilting point and greater, but substantial cumulative increases occurred at soil moisture levels between five-sixths and three-sixths wilting point.

More soil samples were taken under mature coffee to a depth of 9 ft. and were examined for soil nitrate nitrogen content. Accumulations were found

between 5–9 ft. which varied quantitatively with the horizontal distance at which the samples were taken on the diagonal between four trees, and the total quantity of nitrate nitrogen again showed differences under single- and multiple-stem pruned trees.

The full-scale yield trial to examine chemical weed control in mature coffee, mulched and unmulched, continued. Yield results for the 1954/55 crop season treatments, a low-bearing year, were not significantly different, but the results for the second year (1955/56 crop season) when heavy crop yields were recorded, showed that treatments had significantly influenced the yield. Spray weeding with P.C.P., or a P.C.P. plus 2, 4 D mixture in a mixed aromatic oil base, increased the crop yield by 2 cwt. of clean coffee per acre over the non-weeded plots. (Non-weeded plots refer to weed control *during* the long and short rains periods; all plots are cultivated mechanically after the rainy seasons.) Good weed control during the rains by normal estate methods, i.e. hand slashing, pulling and cultivation, gave yields which were similar to those obtained with chemical sprays and it would appear that these two alternatives are of equal value in terms of crop yield level. No chemical taint was detected in liquored coffee samples taken from the 1954/55 season crop. The 1955/56 season's quality samples have not yet been examined in this respect.

Coffee leaf nitrogen figures obtained on samples collected during the long rains in 1955 in the control (unweeded) and spray-weeded plots were significantly higher in the material collected from the spray-weeded plots.

The cambered bed cultivation system trial on a "vlei" soil was planted to Napier grass (*Pennisetum purpureum*) in the early long rains 1955, and establishment was good. The first post-establishment cut in July showed very substantial yield responses to phosphorus fertilizer and cattle manure. The distribution of the short rains 1955 were such that the second harvesting had not begun at the time of writing, but substantial treatment differences were again apparent.

Chelated micro nutrients are being studied in relation to green vein chlorosis of coffee and in relation to pineapple yellows. In respect of the former condition, the diethylene-triamine-penta-acetic acid iron chelate (D.T.P.A.) has proved to be a more effective curative spray than the iron chelate of ethylene-diamine tetra-acetic acid (E.D.T.A.) and has been found to give a more even "greening-up" response than a solution of ferrous sulphate. Tests of the compatability of these chelates, and ferrous sulphate, with a standard proprietary tonic copper spray material have shown that no results from the iron can be expected if applied in this manner.

Attempts to find a suitable mineral liquid injection technique for diagnostic work on pineapples in the field have so far been unsuccessful. Puncturing the leaf of a plant suffering from pineapple yellows whether with a hypodermic needle, or with a scalpel so that a small wick leading from a reservoir may be inserted, itself often results in a circular patch of colour recovery, i.e. the tissue "greens up" in the immediate vicinity. Pot experiments with chelated micro nutrient applications to the soil, have provided apparent responses in improved foliage colour to iron and manganese.

The need in the coffee industry for a reliable moisture meter for determining the moisture content of both parchment and clean green coffees has become apparent during the last two seasons. A meter, preferably both mains- and battery-operated for universal acceptance, must provide results with a fair degree of sample consistency and reproducibility. Work has been carried out with the accumulator-operated Baldwin N.P.L. moisture meter and the battery-operated Marconi moisture meter during the last crop season but with little success. Work

carried out by the East African Industrial Research Organization with the Toplis and Simpson "Kappa" moisture meter (mains operated) has shown that this is an excellent instrument for use with parchment coffee. A battery-operated model of this moisture meter type is to be tested in the immediate future.

Pyrethrum

Breeding.—305 new single plant selections were made at the various stations. The total number under observation was 456. 43 tested and promising clones were bulked up for use in crosses or for direct issue to growers, which raised the total of multiplied clones in store to 298. It was again not possible to have any of the parent clones or the new hybrids tested for their biological effectiveness, with the exception of seven samples of C.47 which had been sent to the United Kingdom in 1954. The results of these tests indicated no discrepancy between the chemical assay and the insecticidal effect and it was decided, therefore, to issue again seed of C.47. The seed production fields for Molo, Subukia and Ol Joro Orok Bulk, C.43 and C.51, were enlarged. 26 isolated plots were established for the production of 20 new crosses (hybrids) and the continuation of the "sugar beet" breeding system.

20 yield trials spread over most of the pyrethrum growing areas were planted or maintained with the object of testing new hybrids under varying conditions. Apart from C.43, C.51 and C.79, which continue to give a good performance, a number of more recent varieties (mainly O.1, O.4, M.9, M.15, M.20 and C.92) are showing promise; their parent clones are being multiplied in readiness for their seed issue should they come up to expectation. Studies of pollination and seed setting problems were continued.

Bud Disease.—The incidence of the fungus, *Ramularia bellunensis,* increased during the exceptionally wet and cold months of August and September, and a fairly heavy infestation was observed up to the end of the year. Selection for resistance to the disease amongst the breeding material continues.

Weedkillers.—Dalapon, Trichloro-acetic acid (TCA), Maleic Hydrozide and PDU (a urea compound) at four different levels each were applied to a grass ley in preparation for the planting of pyrethrum. Only Dalapon and TCA at the higher (and possibly uneconomic) rates showed an appreciable effect on the grass. Pyrethrum planted some weeks after treatment did not suffer any setback.

Stripping Trials.—Results of the trial planted in Molo in 1954 indicated that by stripping down to buds at two- and three-weekly intervals, considerable losses in pyrethrins were incurred, while these were less pronounced at four-weekly intervals; when stripping was left for six weeks, the inclusion of buds produced the best results. The highest yields of pyrethrins were achieved through stripping down to flowers with horizontal petals at intervals of two and three weeks. An identical trial was started in Ol Joro Orok.

Cutting-back Trials.—It was found on four stations that cutting back of the early flowers developing soon after planting had apparently no influence on the vegetative growth of the plants nor on subsequent flower yields.

Fertilizer Trials.—A new series of phosphate/ridging trials were established in widely distributed areas. Finalization of results is not yet possible but it appears that the range of soils which would respond to phosphatic treatment is larger than was previously assumed. The most outstanding yield increases through superphosphate, either applied in the planting holes or placed underneath ridges on which the pyrethrum was planted, were recorded on poor, reddish soils at Londiani, on cleared bushland on the Kinangop and on "veld" at upper Molo

and Dundori. Where the rains have been rather heavier, yields were increased also through planting on ridges.

Irrigation Trial.—An experiment was started in the Molo nursery with the object of ascertaining whether overhead irrigation applied in dry spells during and after the cessation of the rains would result in an economic increase in flower yields. The frequency of irrigation is being determined by log-ohm readings of gypsum blocks inserted at different depths in the soil. Owing to the unexpected heavy rains in December, no results can be reported yet.

Sisal

No new trials were planted during the year apart from a few observation plots on herbicides. A large amount of travelling was undertaken to supervise, record and cut the 12 external trials ranging from Voi to Kitale.

The third cycle of one of the nursery trials was lifted and replanted in April, 1955.

The plots receiving sisal waste were more uneven and more plants were lost than in the plots not receiving waste, which seems to indicate that when nurseries have had an application of sisal waste, the planting of bulbils should not be done immediately after the application of the waste. The weed growth in the waste plots was considerably greater than in the other plots and this gives an indication of the improved fertility in these plots.

The advantage of big graded planting material was again demonstrated in the planting material trials where small-sized suckers from two-year-old fields were compared with big heavy suckers from old fields. The latter produced longer leaves and more fibre during the same period whereas the big suckers have shown no advantage over slightly smaller nursery plants. As all the plants were well graded, the advantage of grading plants from a nursery as compared with grading suckers from old fields is fairly obvious.

One of the trials clearly demonstrates that there is no advantage in planting bulbils straight out into the permanent positions in the fields as this has led to uneven plants, a prolonged period of hand-clearing and a delayed first cut. This indicates that any mechanical planters which may be used at a later date must be built for plants of a size usually lifted from a nursery.

It has been demonstrated that grading, which can be done in several ways, is satisfactorily done if grading for height only takes place. If the grading for height is combined with grading for weight, a more even stand is achieved but it is considered that the extra work involved may not be justified economically and would only be of value if the plants were taken from a very uneven nursery.

A trial of "curing" or drying out of plants for up to three months before planting indicated only small variations whether the curing took place in the open or covered with a layer of grass. The variations between no curing and curing for one, two, or three months were small and the salient fact was that the plants grew well with no losses after curing. If the plants can lie on the ground for up to three months without damage, it may also be expected that they can stand in the soil without being damaged and this may lead to a planting programme spread over longer periods of the year. This might be done by a small trained labour force, with the consequent easier control and better results, instead of relatively large areas being planted by untrained labourers in a comparatively short time before the rains. This idea is being tried out on a large estate in the Thika district.

The external spacing and cutting trials clearly showed that, in all cases, the lower plant populations grew leaf faster per plant than the higher

populations. This is not desirable because it leads to an earlier completion of the cycle and earlier expense of replanting. Also, the higher plant populations produced a larger number of leaves per acre.

Only where the trials were on very uneven or poor soil was there an indication that the higher populations of 2,000 plants per acre produced a shorter leaf. Leaf length and rate of leaf growth depend upon the fertility of the soil, but cutting is the most important introduced factor which influences the length of leaves grown. The first cut taken at various stages of plant development appears to influence the future development of the plants more than the intensity of cutting used during the cycle. A first cut taken too early will inhibit the full development of the leaves and can impair the plant for life by producing a shorter leaf: a heavy cut, leaving a small number of leaves on the plant, will do the same, but to a lesser degree.

The comparison between single and double row planting was clearly in favour of the double rows in all three plant populations under observation: this result is attributed to the wider space between the plants in the row.

The fertilizer trials have shown that in all cases an application of sisal waste improved the growth of the plants and responses to sulphate of ammonia are becoming apparent in some of the external trials.

In the hybrid trials, the tendency is for the hybrids to produce a greater number of shorter leaves. The hybrids have not yet been cut. The so-called non-flowering plants which were compared with *Agave sisalana* were cut during 1955, yielding about one-third of a ton of very short fibre per acre. The leaves were short and four to five times as many of them were needed per ton of fibre as in the case of common sisal, which yielded over one ton of fibre per acre. A longer life is expected of the selected plants and they may eventually produce the same quantity of fibre, but it is obvious it will always be much shorter in length.

No new herbicidal trials were planted during the year, but small observation plots indicated that the effect of C M U on "couch" is negligible at rates up to 40 lb. per acre when applied to foliage. Dalapon showed promise in controlling "couch" but at the rates used it had an adverse effect on growing sisal.

In the first "couch" control trials planted 1951 and 1952, in which sodium trichloro-acetate was applied pre-emergent to "couch" and before planting the sisal, the initial boost given to the sisal plants growing in fairly clean soil is still apparent, although the areas are now smothered by "couch". There are indications that sodium trichloro-acetate causes dieback and leaf distortion when applied to the soil after the sisal plants have developed a root system: this may be only a passing effect, but it is being kept under observation.

Sugar

Trials on sugar cane at Miwani are now yielding results that are showing up the better varieties for the locality. CO.331, CO.213, CO.434 and CO.419 show very great promise after a trial which went through to its second ratoon; other useful varieties include CO.453, N.CO.291 and N.CO.79.

A fertilizer trial using molasses and filter press mud in combination with sulphate of ammonia each at three rates of application, showed no significant responses in the plant crop.

A herbicide trial on plant cane, using T.C.A., M.C.P.A., P.C.P., T.C.A., plus M.C.P.A., and P..C.P. plus M.C.P.A., and with no weeding between planting and harvest yielded rather inconclusive results as no treatment was capable of keeping the crop weed-free for long enough between planting and canopy formation. It

appeared that for grass control T.C.A. is required, for dicot, control M.C.P.A., but that one pre-emergent application of the latter is insufficient.

The first ratoon harvest of a cane variety trial at Kakamega showed that this crop can be very satisfactorily grown in the area, B.3337 and CO.421 being outstanding varieties in both plant and first ratoon harvests.

A spacing trial at Chemelil, now concluded after its second ratoon, confirmed that six-foot row spacing caused no reduction in yield compared with four- and five-foot spacing, the wider row width facilitating the practice of mechanical cultivation.

Horticulture

There is no doubt that canning and other forms of processing of horticultural produce offer the best means of developing the horticultural industry on a large scale in Kenya. During 1955, therefore, the work of the horticultural section was concentrated more on crops suitable or potentially suitable for this purpose. A tremendous amount of work requires to be done, not only on the production of canning crops and the suitability of different areas for the purpose, but on potential markets for our canned produce.

The Senior Horticultural Officer made a study tour of the South African pineapple industry before proceeding on vacation leave, and the opportunity was taken to obtain information on citrus and deciduous fruits in South Africa.

Recent results obtained from pineapple trials will be of considerable benefit to the industry. The standard Hawaiian spacing, which has been consistently recommended by the horticultural section since 1950, has been vindicated by the first results of a spacing trial at Thika. The yield of the plant crop was 27 tons per acre, as compared with 14 tons per acre from the old spacing used in Thika, of 1 ft. × 2 ft. × 9 ft. in three-row beds. This trial was carried out on new land and, in addition, 1,000 lb. of sulphate of ammonia was applied; the yield of 14 tons at the wide spacing is virtually the same as was obtained at the same spacing in the first fertilizer trial on replant land with sulphate of ammonia, at 2,000 lb. per acre. The highest rate of nitrogen application in the second fertilizer trial on replant land was about 1,200 lb. per acre of sulphate of ammonia, the plant crop yield was 13.7 tons, again at the same spacing. A full comparison cannot be made before yields of ratoon crops have been recorded but the results to date do indicate that we have gone far towards solving the replant problem. Several trials have been started to investigate the possibilities of growing pineapples on vlei soils by planting on ridges. Although no crops have been harvested yet, growth of the plants is most encouraging.

Youngberries at Molo yielded at the rate of 6,200 lb. per acre during 1955. Canning tests have been carried out on the crop and the results are excellent. Youngberries are now regarded as proved for commercial production in Molo and similar climates; planting is recommended for both fresh marketing and canning.

Tomato trials for *purée* production, carried out during 1954-55, indicate that profitable yields at the price likely to be paid for canning, can be expected, provided the crop is grown in suitable areas and with cultural methods customary for canning tomatoes. The Californian system of direct sowing in widely-spaced rows, with no staking or pruning of the plants, has proved successful and is likely to be the most economical system to use here, at any rate for European growers. The control of Blight, *Phytophthora infestans*, is a major factor in the successful production of tomatoes. As control by spraying is expensive and not very effective, it is most important that crops should be grown in areas and at times of the year when Blight is unlikely to become serious. Irrigation is regarded as essential for commercial production.

A trial of canning peas carried out at Molo was spoilt, in so far as yield records were concerned, by heavy rain. The variety Unica, however, was an exception, producing an excellent stand which was cut and put through a vining machine. The resulting yield was at the rate of 7,000 lb. per acre, an exceptionally good yield, even if the crop had been hand picked. Canning tests were carried out on all the varieties grown.

In order to assist in formulating a policy for citrus-growing at the Coast, a survey of existing citrus in the area was undertaken during the year.

Plant Pathology

Advisory work.—379 specimens were received for disease determination during the year, an increase of 40 over the 1954 figure. There were 82 visitors in connexion with these specimens. During the latter part of the year, cereal disease advisory work was undertaken during the absence of the Plant Pathologist from the Plant Breeding Station at Njoro.

A disease causing dwarfing of *Trifolium semipilosum* and *T. rueppellianum*, at the Grassland Research Station, Kitale, is being studied.

Diseases affecting Chillies in both the Coast and Central Provinces were the cause of a number of inquiries. Rust of antirrhinums (*Puccinia antirrhini*), which first appeared in the Colony in 1954, has proved serious, particularly among commercial growers. A poor wheat crop occurred in many areas and was attributed, in part, to unfavourable weather. Superficially the symptoms resembled those of the "Whiteheads" stage of "Take All", but no pathogens were found.

A survey of citrus diseases at the Horticultural Station, Matuga, Coast Province, revealed Stem Pitting virus disease and suspected Psorosis virus disease.

Septoria lycopersici on tomatoes showed a greater incidence than in previous years but Blight (*Phythophthora infestans*) on both tomatoes and potatoes was normal.

Multiplication of Corstorphine blight resistant potato stocks continued. Four of these varieties have proved immune over the past two or three years and sufficient stocks of these varieties will soon be available for distribution to growers. A blight resistant tomato variety, also received from Dr. Black at Corstorphine, is being multiplied. This variety proved resistant but not immune in 1954.

Legume Inoculants.—308 orders totalling more than 3,000 units were received during the year, an increase of 33 per cent over the total for 1954. The routine isolation and testing of cultures of indigenous strains of *Rhizobium* was continued. An examination of the factors affecting nodule formation in the Trans Nzoia was completed and a series of pot experiments to measure the nitrogen fixed by indigenous legumes under local conditions was started. Further progress was made in laboratory technique and in the perfection of a standard test method.

Seed-Testing Laboratory.—1,593 samples were received for testing during 1955. This represents an increase of 686 (75 per cent) over the total for 1954.

In addition to these routine tests, special tests were done on grass seeds in connexion with field experiments at the Grassland Research Station, Kitale. Tests were also done on seeds submitted for competition at the Royal Agricultural Show, Nairobi.

An experiment investigating the effects of pregermination treatment of beet seed was carried out. A series of experiments to test the germination of freshly harvested barley on soil versus sand was started with the 1955 harvest and will continue through most of 1956.

Three exhibits were prepared for Department's stand at the Royal Show at Mitchell Park. These demonstrated the principles of plant disease control, legume inoculants and nitrogen-fixation by legumes and the work of the seed-testing laboratory.

Entomology

Work on the Barley Bulb Fly continued and satisfactory control was obtained by the use of liquid seed dressings. Of materials tested the best were endrin, aldrin, dieldrin and chlordane.

The first successful control of harvester ants was achieved with a bait of maize flour and aldrin.

Maize stalk borer control experiments continued and tractor spraying with endrin and D.D.T. emulsions showed promise.

Black Wheat beetle was controlled by seed dressings of aldrin and B.H.C.

The Coreid bug of coco-nuts continued to cause severe nutfall especially in the drier areas of the Coast. Work on biology and control of this pest was begun.

Rhinoceros beetle is responsible for loss of many coco-nut palms. Efforts to have dead and dying trees removed have not been sufficient.

Citrus bud mite has been found widely spread in all parts of the country. It is a major cause of poor growth of citrus in all areas. High-pressure spraying with chlorobenzilate is an effective control and spraying schedules are being worked out. Work has also been carried out on the Coast on the control of citrus rust mite and citrus red spider mite.

The tingid bug, *Teleonemia scrupulosa,* is established in the Coast and Central Provinces on *Lantana camara.* It is too early to assess its degree of control of the weed.

Work in Nyanza continued to be chiefly on cotton pests. Dusting with a B.H.C./D.D.T. mixture has given large yield increases on several trials scattered throughout the Central and Southern districts. Pest assessment experiments were sited at Kibos, where stainers caused the greatest losses this season, and at Bungoma where *Lygus* was the main pest. Survey of pest numbers and distribution on peasant-grown plots continued. Dieldrin has been used with great success to protect young sugar cane against termite attack.

Progress was made on the study of African mealybugs in collaboration with the Commonwealth Institute of Entomology, London, and on the general study of East African Coccidæ.

Experimental work on the control of pests in stored products was continued. The recommendations in respect of crib and bag treatment and the methyl bromide fumigations carried out by Maize Control against the Maize Weevil have achieved a remarkable measure of control of this primary pest. The secondary pests, *Tribolium* and *Oryzæphilus* have been present in large numbers and work on their control, by fumigation, bag treatment, and spraying of railway trucks with insecticide formulations containing urea-formaldehyde resins have continued.

Soil and Agricultural Chemistry

On the 1st July, 1955, the Pyrethrum Board took over responsibility for much of the pyrethrin analyses work which had previously been undertaken by the Department. Thereupon the Pyrethrum Section of the Scott Agricultural Laboratories was closed and responsibility for certain chemical assays in connexion with

pyrethrum breeding and for the independent certification of samples was transferred to the Chemical Section. Investigations of the false pyrethrins was continued and a paper chromatographic method was developed for the estimation of false pyrethrins II. As a result of these investigations, it was established that, contrary to earlier belief, the false pyrethrin II content of pyrethrum flowers is independent of the pyrethrin I/II ratio in the flowers.

Lime Studies

The lime studies initiated in 1953 were continued both in the field and in the laboratory. Nitrogen, phosphate and potash were reapplied to all the field trials concerned; these were planted either to wheat or barley and observations on growth and yield effects were continued. Laboratory studies on soil and leaf samples from the field trials were again undertaken. The effect in the first year of liming on the exchangeable calcium/exchangeable magnesium ratio of the soil was found to be much greater at the Molo than at the Kinangop site: its effect on the calcium/magnesium ratio of the leaf was negligible even at the Molo site. Phosphate application on the Kinangop site led to appreciable increases in both acid and alkali soluble inorganic phosphorus but to only small increases in organic phosphorus in the soil.

Soil Organic Matter Studies

Further survey studies of soil organic matter in relation to cropping history were undertaken. On samples collected on the Kinangop, the loss of total organic matter on cultivation was found to be much greater on Kinangop grey silt loam than on Upland orange loam. Estimation of humic material by sodium fluoride extract was undertaken on samples collected on the Kinangop and on preceding surveys. The humic organic matter content so measured was found to be depressed in the soils examined slightly less than the total organic matter as a result of cultivation. The acidoid content of the sodium fluoride soluble humic material was little affected by cultivation but varied greatly from district to district.

Problem Soil Studies

A replicated field trial based on earlier pot culture studies and involving examination of the effects of lime fertilizers and cultivation on the improvement of established Kikuyu grass was laid down in the Kikuyu bracken zone and appropriate soil samples were collected from the site for laboratory studies. Profile samples from the Experimental Station which is being developed at Kanja, Embu District, for investigating land utilization in the bracken zone were analysed and were found to be acutely deficient in available forms of all the major mineral nutrients: confirmation of these laboratory findings and their extension to include the trace elements is currently being undertaken in new pot culture studies. Other pot culture studies on Dwarf beans confirm the need for liming the bracken zone soils and demonstrated a relative ineffectiveness of manure application at 10 tons per acre, double supers at 100 lb. per acre, magnesium sulphate at 200 lb. per acre and sodium molybdate at 1 lb. per acre: liming to pH 5.8 (involving a dressing of 4,480 lb. slaked lime per acre) or over proved not significantly better than liming to pH 5.0 (involving a dressing of 1,720 lb. per acre).

Further pot culture studies on soil from the Njoro deficiency area have indicated significant deficiences in nitrogen, magnesium, potassium and copper but not in phosphate, iron, manganese, zinc, boron or molybdenum. The potash effect was unexpected in view of the high level of exchangeable potash (4.15 M.E. per cent) in the soil.

Soil Surveys

The major effort of the Chemistry Section, both in the laboratory and in the field, was on soil surveying in connexion with irrigation development. Assisted greatly by officers loaned from districts, detailed field surveys of over 100,000 acres in the Mwea/Tebere and in the Tana Delta areas were undertaken, about 2,000 profile pits were dug and some 2,000 samples collected from 700 profiles for laboratory examination. Additionally, over 1,800 soil and water samples were received for examination in connexion with the survey by Sir Alexander Gibb & Partners (Africa), of irrigation potential in Nyanza Province.

Sites were chosen near Hola and preparations were put in hand for the testing of the possibility of reclamation for irrigation of the saline soils of the desert hinterland in the Lower Tana. A 500-acre block of land was chosen in the Mwea/Tebere area for development as a major irrigation investigation and training centre and a detailed soil survey of the site was undertaken. Development of this station was started and preparations are well advanced for the first cropping of 15 acres of it under irrigation in the long rains, 1956.

Some further progress was made by field officers in the preparation of soil maps of their districts and in the co-ordination of the district maps within the provinces. The E.A.A.F.R.O. Soil Survey Team completed a soil map of the Ol Joro Orok Experimental Station and has prepared draft soil maps of the Pasture Research Station and the Experimental Station, Kitale.

Eradication of Prickly Pear

In the absence of reapplication of herbicides, the prickly pear infestations which were sprayed in late 1953, and early 1954, have made complete recoveries.

Plant Breeding and Selection

Cereal breeding continued at the Plant Breeding Station, Njoro, and associated departmental stations at Molo, Ol Joro Orok, Eldoret, Kitale and Rongai.

A new physiologic race of black stem rust has arisen and yet a further one is suspected. These two new races make the fifteenth and sixteenth stem rust races to be isolated in East Africa, and they are accordingly designated K.15 and K.16. The race, K.15, was found on a new wheat in the multiplication plots at Njoro, and K.16 is suspected on a number of established varieties in Kenya; it was isolated also from Tanganyika. A field survey showed that the main races during the season in both Kenya and Tanganyika were K.14, K.15 and the suspected K.16. Climatic conditions are considered responsible for the severe and widespread outbreak of stem rust, the worst experienced for many years. Unlike other years, rust came early enough to cause severe and widespread damage. Most wheat varieties were affected to a varying degree; those most severely damaged included 261, 294, 318, 341, and 184P. In contrast, Canadian Regent and the two country-bred varieties 354 and 321 stood out as showing considerable rust resistance, the former in particular remaining free from attack. The wet season also favoured the spread of glume blotch, and both "Take All" and *Pyrenophora* root rot were widespread and caused considerable damage. It is again emphasized that both these diseases are the direct outcome of wheat monoculture and their control depends upon better farming standards and proper rotational cropping.

The severe attacks of stem rust have caused considerable dismay but the long-term position in the breeding work gives hope that this setback will not last for long. Nevertheless, the present position is not a happy one. As explained last year, in searching for sources of rust resistence considerable emphasis is placed on the sifting of imported breeding material and on the various wheat nurseries, which

contained some 580 varieties this year. Of varieties taken from previous nurseries, 99 were given seedling tests to the later forms of stem rust and at the same time were put into small multiplication plots. Some of these varieties seem very promising for direct use in Kenya and a number were, in fact used as a basis for the crossing programme for the year. These crosses, grown under irrigation in the dry season, will be in the F2 generation in the normal 1956 sowing season. It is hoped in this way to push them forward rapidly and so utilize this material as quickly as possible as a means of overcoming the lack of adequate genes for rust resistance in current Kenya wheats.

In the main programme at Njoro, 44 crosses were continued on the pedigree method, supported by 95 more which were run as selected bulks. At Molo, initial multiplication of derivatives of two crosses was continued and, in addition, 22 further crosses were grown there for selection work. The usual extensive variety trials were carried out on all stations and varieties of merit were multiplied. The number of such varieties was 83 this year and the acreage involved rose from 1,500 in 1954 to some 4,400 in 1955; unfortunately, a considerable proportion of this large acreage had to be abandoned on account of the susceptibility of the varieties concerned to the new forms of stem rust. Work with barley and oats continued, though on a somewhat reduced scale in view of the need to give priority to wheat. The well-known barleys, Proctor and Carlsberg, and a number of promising oats, notably Boone and R.L. 1734, were multiplied for release.

New varieties released for the 1955 season were the wheats 354.P.3.B.2.B. and 356.A.12.C., both for medium altitudes, and the oat, Vikota. This oat is a grain type which has done well over a wide range of conditions, but is, unfortunately, not acceptable for porridge-making on account of a peculiar taint in the product.

The maize work at Njoro now shows further emphasis on the development of synthetics. The first synthetic was grown on a field scale at Egerton College and, at the same time, was used as the tester in a second series of top-crosses, which will be put into trial in 1956. From these results it will then be possible to produce a second synthetic, complementary to the first. The main programme of selfing continued, with particular emphasis on the basic inbreds. However, whereas the standard of uniformity was good in the newer material, the older inbreds continued to show considerable out-pollination to have taken place in earlier generations. In fact, few of these 13 inbreds can be considered pure enough for further use in their present form, and work is now held up pending their purification. It is, therefore, particularly appropriate that work on synthetics is being pushed forward with greater emphasis, in an endeavour to provide improved maize more rapidly and more simply than by the classical hybrid maize procedure.

At Kitale the same general picture applies, and here again the multiplication of a synthetic was begun. Detailed work on the old inbreds showed them to be far from pure, and in both top-cross and single-cross trials it appeared that their potential value for hybrid work is not very promising. Further material is coming forward for assessment, but here again the immediate emphasis has shifted from hybrids to synthetics. The arrival of a maize breeder at Kitale should greatly improve the effectiveness of this work, which had previously been conducted from Njoro.

In the breeding of maize resistant to the rust *Puccinia polysora*, back-crossing to local white maize was continued, now giving the second back-cross. At the same time, selfing was continued in crosses to obtain pure-breeding resistant lines. In addition, certain further material was received from E.A.A.F.R.O., for assessment of field resistance. This work was carried out this year at Kwale, in view of the poor rainfall experienced in previous seasons at Kibarani, and this new site proved far more satisfactory.

A special line of work now being undertaken is an extensive investigation into deterioration of baking quality in wheat. This deterioration has been increasingly apparent for a number of years and is causing grave concern. This investigation is being carried out conjointly with the millers, Unga Ltd., and E.A.A.F.R.O.

In accord with the policy of developing the Plant Breeding Station, the land was resurveyed during the year and a layout of fields was planned which will allow more effective utilization of the area available. New building included the construction of two houses and certain further chambers for rust culture work. There were no staff changes during the year other than the appointment of an officer for maize breeding at Kitale, making the third plant breeder in the section as a whole.

PART III—FIELD SERVICES

Progress in Improved Farming

EUROPEAN AREAS

Farming in the Highlands is making steady progress towards the objective of a satisfactory balance between arable and ley acreages. The acreage of grass leys has increased, fodder production has reached the stage where especially in Nakuru district the making of hay and silage has become routine and both stock numbers and dairy produce output have gone up.

Farmers are fast realizing the scope of returns made possible by the planted grass ley and the figures indicate rapid progress in Nakuru district and the Trans Nzoia and rather slower but none the less very satisfactory progress in the Uasin Gishu. In the high altitudes of Nakuru and Ol Joro Orok districts much more grass is being planted with good returns. A good example of this is a rye grass ley planted in April which gave a return in terms of liveweight increase of sheep amounting to £45 per acre.

Again in 1955 there was an increase in the number of cattle in European farms in all districts of the Rift Valley Province. Deliveries to the Thomson's Falls Creamery have risen by 8 per cent and the Naivasha Creamery deliveries over the last ten years have risen by 85 per cent for whole milk and 40 per cent for butterfat. In the Trans Nzoia whole milk production has increased by 340,000 gallons and butterfat by over 1,000,000 lb. and in the Uasin Gishu the corresponding increases are 300,000 gallons of whole milk and 150,000 lb. of butterfat.

Beef production has again not increased to any extent during the year and until the marketing situation improves is likely to remain a purely ranching enterprise. There are indications that crossbred animals may play an important part in future ranching plans. Sheep numbers continue to increase, especially in the high altitudes, and the returns from well-managed flocks are good. The pig population shows little change but the production of baconers has shown a decline notably in the Trans Nzoia. Production is expected to increase in the Ol Joro Orok district where the barley crop is proving to be more profitable when disposed of through the pig.

The Agricultural Lands Rehabilitation Fund was wound up during the year provision for further financial reinforcement of farm development being made in the Agriculture Ordinance which came into effect on 1st July.

Seed Certification.—The Seeds Officer, Nakuru, inspected 7,461 acres of seed wheat and barley of which 3,305 acres were passed for certification. In the seed-cleaning plant at Nakuru the following seeds were cleaned:—

Crop	*Bags*
Wheat	326
Barley	151
Maize	55
Grass Seed (Cocksfoot)	15
Grass Seed (Rye Grass)	1
Clover	14½
Vetch	33
Pyrethrum	1,112
Lettuce	191

ASIAN AREAS

In the Nyanza Province the area farmed by Indians is mainly devoted to sugar production and this is managed satisfactorily though the practice of

ploughing straight up and down a hill to aid drainage also facilitates soil erosion. Indian farmers who are not sugar producers are very few; a great proportion of them are not resident on their farms but work in Kisumu and use the farms to add to their income. Apart from sugar-growing there are no sound agricultural practices to be seen on Asian farms in Nyanza. Small quantities of maize and chillies were produced apart from the output of sugar which is detailed in Part I of this report.

Asian-owned plantations and smallholdings in the Coast Province are well-managed and productive and are of a generally higher standard than the European-owned enterprises in that Province. Scattered throughout Mombasa Island and in a radius of a few miles from the Island are numerous irrigated market gardens mostly of an acre or two in extent where production has attained a high degree of intensity. An example is a holding of one acre employing besides the family five men at £4 each per month and using over £50 worth of imported manure yearly. The land carries up to five crops per year and it is probable that a return much exceeding £500 per acre per annum is realised. Many of these holdings are associated with ancient wells now harnessed with submersible electric pumps. Areas having good soil and fresh water close to Mombasa are almost entirely taken up by Asian smallholders. The range of produce from the larger holdings and estates is considerable and includes sisal, coco-nuts, bananas, sugar, mangoes and citrus.

African Areas

General.—Progress in the African areas during the year has been good and there can be no doubt that the stage is now set for rapid strides in the next few years. The extra staff and funds provided by the Swynnerton Plan are having the desired effect.

Nyanza Province.—North Nyanza continues to lead the Province in better farming. A total of 168 farms were surveyed for farm planning of which 128 plans were put on the ground covering a total of 5,831 acres. The demand continues particularly in what is now the Elgon Nyanza District and many farmers are making very hopeful progress there. Capital development, where possible, is done early by means of a loan and cash crops are provided as soon as possible in order to give the farmer money with which to develop. Elsewhere in the Province notable progress has been made in the Kuria Division of South Nyanza where farm-planning teams have been started and in the Kisii highlands. In Kericho district farm planning was carried out on the Kimulot Settlement Scheme and at Intermediate School Farms.

There has been a general slight increase in the percentage of land under sound systems of farming during the year. Consolidation and enclosure is necessary before the land can be properly used and this is proceeding most rapidly in unfragmented areas such as the Kuria Division in South Nyanza. In the fragmented areas progressive individuals are prevented from consolidating their holdings by opposition from the neighbours.

The scheme for "Rewards for Good Husbandry" was reduced to a minimum during the year. The increasing shortage of funds in North Nyanza make it necessary to reduce awards in that district and also Maize Bonus awards. The ill-effect of the spoon-feeding involved in rewards is now evident. Many farmers are unable to see the point of constructing manure sheds since the African District Council has stopped paying them Sh. 100 for doing so. In South Nyanza rewards never reached the same scale as in North Nyanza and during the year those rewards given were all in kind and mainly connected with animal husbandry. In Kericho district the giving of awards has ceased and inducements for better farming now

take the form of permission to grow a cash crop, to purchase an improved bull, or to take out a loan.

Loans are replacing awards for better farming. In North Nyanza these were tied to farm planning and were repayable over a five-year period. In Kericho district they were applied to the provision of water supplies where the farmer had achieved a specified standard of development.

The use of fertilizers is mainly confined to maize grown in North Nyanza where plans have been made in the Kimilili area for Maize Co-operatives to handle phosphate supplies in bulk.

Rift Valley Province.—There has been steady progress towards better farming in all districts with the exception of Baringo. Enclosure continues and in some parts of Nandi is now almost complete. This has resulted in increased cattle sales, better management of grassland and the wider use of farmyard manure. Demonstration holdings are proving invaluable both as a living picture to the local African of what is required and in supplying information on returns. The Kapsabet holding of 10 acres showed a profit of £10 per acre after allowing £8 10s. per acre to be returned in the form of capital expenditure. Farm planning of individual holdings cannot now keep pace with the demand. Visits to previously planned farms show that in the majority of cases the plans are going well. A further 1,600 acres in Nandi and 3,200 acres in Elgeyo were surveyed in preparation for conservation planning and subsequent planning of individual holdings. Loans continue to be granted to progressive farmers for farm development and another Farmers' Club has been started in Elgeyo. Both in Nandi and Elgeyo attempts are being made to encourage fodder conservation. In Nandi Napier grass planting is going ahead and in Elgeyo there has been an increase in the use of oats for grazing and in the number of silage pits made.

In Baringo progress is slow mainly due to the inability of the Tugen to follow any sort of plan without an inordinate amount of supervision.

In the semi-arid areas the grazing control schemes at Riwa in West Suk and Esageri in South Baringo are proving successful and point the way for future work in these areas.

Central Province.—Although Emergency conditions still dominate the situation in the Province much has been achieved during the year. The terracing of hillsides continued apace together with the planting of live wash stops, the clearing of bush and bracken, the planting of grass, the closing and reconditioning of denuded land and the building of cattle sheds. Enormous supplies of manure have been made in the cattle sheds the erection of which was the outcome of policy of "Villagization". This manure has been successfully transported to the arable lands. Details of the improvements effected in the districts will be found in Table F.

Towards the end of the year it became possible for individual smallholders to devote more of their time to their own farms and hedges were again being trimmed, pastures cleaned and there was a definite return to the former high standard that these smallholders showed. Unfortunately it is still not possible for these smallholders to live on their farms or keep cattle there but the cattle can return there by day and the farmer is now really making an effort to get his manure from the village back to his own land.

Perhaps the most remarkable progress in the Province however has been achieved in the consolidation of fragmented holdings. Over 25,000 acres had been so consolidated and of this total 7,627 acres was actually demarcated into individual holdings by the end of the year, 5,000 acres being situated in

Fort Hall district. These results could not have been achieved but for the co-operation of officers of the Administration and Survey Departments.

Southern Province.—Progress has been very satisfactory all over the Province especially in the Ukamba districts. In Machakos signs of progress are everywhere to be seen and the number of holdings with neat bench terraces, flourishing crops, cattle sheds and banana trenches are multiplying. The increase in cattle sheds mostly well built and some with brick pillars and iron roofs has been a notable feature of the year. Some locations now claim that every stock owner has built a shed and is feeding his stock therein during the stall-feeding periods of January/February and September/October. The consequence of this policy of sparing the grassland from grazing and trampling during the hot dry weather is a remarkable improvement in the vegetative cover over the district. The greatly increased supplies of manure which result have benefited the arable areas and increased crop yields. High priority is now being given to the planting of fodder to sustain this policy and Napier grass has been widely planted in all river and stream beds and in plots adjacent to the cattle sheds.

In Kitui work has been concentrated on grazing control and management. The estimated acreages of scratch ploughing and grass seeding or planting with Star grass are 7,630 and 3,841 respectively. The restraint shown by cattle owners during a year of great hardship in respecting closed areas was admirable and indicates the progressive frame of mind of the Kitui people. Nearly 60,000 acres of eroded grazings were closed for restoration and 51,000 acres cleared of bush. In the more advanced locations bench-terracing, the building of cattle sheds and the use of manure is on the increase. Even in Masai progress has been recorded in the application of soil conservation measures in the small arable areas and in receptivity to the idea of stock limitation.

Coast Province.—Standards of cultivation, planting, weeding, thinning and harvesting were greatly improved throughout the main cotton producing area in Malindi. Work continued in clearing up undergrowth in coco-nut plantations and in filling from nurseries established for the purpose. In the Teita Hills it is estimated that 99 per cent of the cultivated land was protected by trash lines before the rains.

Reconditioning, Resettlement and Development Schemes

The progress of schemes with which agricultural officers were particularly concerned is described below. These schemes continue to be financed from the various sources described in last year's report.

Nyanza Province

Lambwe Valley.—The development of this scheme is proceeding according to plan. The total number of settlers in the valley is now 677 including 240 who were in the Valley before the scheme started. Livestock were allowed in the Samunye area early in the year and among them only two cases of Trypanosomiasis were diagnosed. It is now evident that a holding of 20 acres is more than adequate to provide for the needs of a family and new settlers are being settled on this basis.

Kimulot Scheme.—During the year nine unsatisfactory settlers were expelled. Steady development has proceeded. The tea nurseries have been expanded and farm planning commenced.

Chepalungu Scheme.—Work on this mile-wide tsetse barrier has been confined to the maintenance of roads, fences and dams and the development of the experimental farm at Kabossan.

Itembe Scheme.—The experience gained at Sotik Post will be used as a basis for settlement in Itembe. It has not yet been possible to allocate any farms but some 200 possible settlers have been short-listed and allowed to remain in the area. Three dam sites have been prepared and one dam has been completed. Two hundred acres were set aside as a breeding centre for the Veterinary Department. It is hoped to develop the scheme as a large reservoir of improved cattle.

Samia Scheme.—This scheme has practically died a natural death. While lack of water in the dams has been blamed for this the real cause is the unsound basis of settlement which devolved on a local committee who were supposed to allocate plots and make rules for good husbandry. The land is, in fact, all owned by somebody and a successful scheme in the fly bush of Central Nyanza requires a responsible Settlement body and people from overcrowded areas who desire the land and have a will to work it.

Kibos-Awach.—The purpose of this scheme started during the year with funds provided by ALDEV is to protect the head-waters of the Kibos and Awach rivers and prevent flooding on the Kano Plains below. The measures being adopted are the closure of steep rocky slopes, terracing of the arable lands and reafforestation.

Central Province

Embu Settlement Scheme.—The aims of this scheme is to settle Wakikuyu Ahoi south of the main Sagana/Embu road. The laying out of farms is now going ahead.

Ishiara.—There are now 30 families settled on two acres each of irrigated land in the hot, low country of Embu district. Excellent crops have been produced and the output of the settlers has at least been doubled in comparison with their old system of cultivation in this area.

Southern Province

Machakos District Reconditioning Scheme. –This scheme has made good progress throughout the district. Of the two areas in the district which were selected for special treatment by the Mechanical Unit the first has now been completed with a framework of 21 dams constructed and terraces throughout the arable areas. The second area is now being tackled with the assistance of aerial survey maps provided by the Survey Department. The communal effort of the people themselves has also made great strides both in the development of individual holdings and in the reconditioning of denuded areas. Over 56,000 acres were grassed down during the year.

Makueni Settlement Scheme.—A further 250 settlers were established bringing the total to 1,250. Further settlement is now taking place to the north over the Keiti River into the area at the south of Kibauni Location which was handed over by the Council for this purpose. So popular is this development that the local Council has offered a further area of about 40 square miles for such settlement. The problem of bush regeneration was tackled with vigour and in 1955, 4,600 acres were stumped.

Kamba Grazing Areas.—The various schemes on the Yatta Plateau, at Simba-Emali, and on L.R.7048 have been severely tested by the dry year and it is clear in all these areas that stocking rates have been indulged in which were too optimistic. The aim now is to use these areas to aid the stock limitation campaign in the Reserves. Surplus cattle from the Reserve which are not fit to go straight to the sale ring will go into these areas to remain there until marketing condition has been attained.

Coast Province

Gede Settlement Scheme.—At the end of 1955 there were 501 settlers established in the settlement. In order to ensure that the arable and fallow rotation was being properly followed each holding was supplied with its own file giving a complete picture of the rotation. In addition a model holding was laid out to show the settlers exactly what was required of them. Efforts to establish several thousand more avenue trees were foiled by dry weather. A coco-nut nursery containing 30,000 nuts was established.

Shimba Hills.—There are now 94 families established at Shimba and the total population is 309 men, women and children. The development of holdings has proceeded satisfactorily. New settlers are required to work communally as a group occupying the first houses that they build and moving across the whole new settlement area until every holding is equipped with a house and has four acres of arable land stumped. When this has been done every settler is then allocated a holding.

Rift Valley Province

Riwa Grazing Scheme.—This covers an area of 25,000 acres in West Suk district. The area has been divided into four large blocks to be grazed in rotation on a communal basis. There has already been a marked improvement in the grass cover. Forty miles of motor tracks have been cut, four grazing guards' huts built and water holes sited.

Esageri-Kisokon Ranching Area.—This is an area of some 26,000 acres in South Baringo which is being grazed on a four-block rotation. The grass cover has improved and all the dams and *haifas* are full. Three more *haifas* were constructed this year.

Sarora Settlement.—This is in Nandi district where 113 families have now been settled on land protected by an overall soil conservation layout. Holdings are 20 acres in extent.

Kaimosi Settlement.—An area of just over 4,000 acres has been surveyed and 45 families have been selected and temporarily established on small plots. A start has been made with the building of a farm institute.

Soil and Water Conservation

Soil Conservation Engineer's Headquarters

The Senior Soil Conservation Engineer had a busy year and his advice was sought not only in all Provinces of the Colony but also in Tanganyika and Uganda. He spent the whole of July instructing at the Departmental course in soil conservation and elementary surveying for 22 officers of the Department which was held at the Egerton College. In the European areas his work included the inspection of 15 dam sites prior to construction by Soil Conservation Units and the checking of plans. To investigate complaints by owners six dams at Kitale, Kinangop, Naivasha and Machakos were visited and farms in Lumbwa, Thomson's Falls, Nakuru and Ruiru were visited in connexion with soil conservation. In the African areas 19 dam and waterhole sites were inspected in Maralal, West Suk, Nandi, Kamasia, Voi, Sotik, Itembe and Machakos. Guidance was also given to staff in all Provinces in regard to Soil Conservation and the planning of African Farms. Much attention was also given to drainage problems and advice was given to the port authorities at Mombasa and the P.W.D. at Nakuru.

Buildings.—The programme detailed in last year's report was completed both at Nakuru and Kitale.

Workshops.—The Field Transport Officer is based on the "Agron" workshops at Nakuru and his reports enable a closer check to be kept on the condition of vehicles. Repairs can be carried out in good time. Isolated cases of neglect have occurred usually through lack of facilities which it is intended to rectify by putting in small service stations in the more remote areas. In the Nakuru workshops 426 jobs were completed including 52 overhauls and the building of two caravans and the assembly of new vehicles and trailers. In the Kitale workshops 297 jobs were completed including 10 overhauls and in addition repairs and maintenance were carried out in the field on Soil Conservation Service equipment. The machinery installed in the Nakuru workshops during the year has started to earn its keep. The large lathe has been used to make spares which have been unobtainable and has covered costs to a total of £283. The use of the Sunnen crankshaft grinder has saved money and speeded up overhauls.

Soil Conservation—European Areas

Terracing.—The area of farmlands protected against erosion in 1955 was 27,094 acres compared with 27,518 acres in 1954. The total area of farmland protected against erosion by the Department's mechanical units has now reached 211,827 acres. There was again an increase in the output of terracing in the Uasin Gishu and increases were also recorded in Nakuru and Thomson's Falls. The five units in the Rift Valley Province actually lost 38,318 hours out of a total possible operating time of 66,319 hours of which 15,040 hours were occasioned by breakdowns, repairs, and time lost in workshops awaiting spares and the rest was caused by inclement weather and the fact that D.7 tractors were idle for long periods owing to the excessive delay in getting dam permits sanctioned under the new subsidy scheme. At the end of the year 27 tractors were in operation on units in the Rift Valley Province, two in Nairobi district and two in the Nyanza Province on the Lumbwa Unit. Comparative figures of work done are set out below, and details for 1955 are given in Table E.

Acreages Protected by Soil Conservation Measures

District	1941–52	1953	1954	1955	Total
Trans Nzoia	34,229	5,924	5,213	4,047	49,413
Uasin Gishu	26,266	4,240	8,937	9,212	48,655
Nakuru	42,598	4,819	4,727	5,292	57,436
Thomson's Falls ..	17,245	10,493	3,862	4,175	35,775
South Kinangop ..	—	—	3,772	3,212	6,984
Nyanza	6,174	1,355	866	179	8,574
Nairobi	2,981	891	141	977	4,990
Total ..	129,493	27,772	27,518	27,094	211,827

Permanent Crops.—In the Nyanza and Nairobi areas much of the land is taken up by permanent crops such as tea in Nyanza and coffee, sisal and pineapples in the Nairobi district. On three estates at Makuyu 2,200 acres of sisal were planted on the contour. In the Nairobi area 57 acres of coffee were planted on the contour and 94 acres were terraced. There has been a tendency in this area to neglect contour planting in favour of heavy mulching only. The acreage of permanent crops known to be protected by suitable soil conservation measures is shown below—

Soil Conservation in Permanent Crops (Acres)

Crop	1941–52	1953	1954	1955	Total
Sisal	4,397	198	1,416	2,200	8,211
Wattle	4,330	226	—	—	4,556
Tea	3,549	496	275	—	4,320
Coffee	960	88	140	151	1,339
New Zealand Flax ..	999	—	—	—	999
Total Acres ..	14,235	1,008	1,831	2,351	19,425

Farm Planning.—The demand for this service continues to increase in all areas. The acreage surveyed and mapped in the Rift Valley Province is almost double that of 1954. The total acreage mapped in that Province is now 154,343 acres of which approximately one half has been planned. The survey work and mapping is carried out by Soil Conservation staff and the agricultural planning is the work of the district agricultural officer and the farmer himself. Details of the work done in 1955 are given below—

Farm Planning, 1955

District	Farms Surveyed and Mapped		Farms Planned	
	No.	Acres	No.	Acres
Nakuru	11	12,008	8	6,100
Uasin Gishu	8	8,034	9	9,954
Trans Nzoia	14	10,151	1	1,588
Thomson's Falls	8	12,641	1	4,000
Nyanza	3	4,137	2	4,000
Nairobi	1	270	3	—
Total	45	47,241	24	25,642

TABLE E.—SOIL CONSERVATION SERVICE—EUROPEAN AREAS—OUTPUT OF TERRACING FOR YEAR 1955

DISTRICT	No. of Farms Treated by Tractor	ACREAGE PROTECTED BY					COMPLEMENTARY WORKS					
		Broad Base & V Terraces	Diversion Ditches (*a*)	Narrow Base Terraces	Bench Terraces	Total	Roads *Yards*	Excavation *Cubic ft.*	Training Banks *Yards*	Outlet Drains *Yards*	Cut-off Drains *Yards*	Small Drains *Cubic ft.*
Trans Nzoia ..	44	3,327	720	—	—	4,047	67,303	71,524	13,877	—	21,215	4,650
Uasin Gishu ..	92	4,085	5,127	—	-	9,212	71,693	36,355	566	4,462	5,924	67,341 (*b*)
Nakuru	39	3,774	1,518	—		5,292	101,555	—	56,241	22.008	49,309	46,183
Thomson's Falls	30	130	4,045	—	—	4,175	60,432	122,242	8,806	1,348	5,883	68,655 (*b*)
South Kinangop	20	—	3,210	—	2	3,212	42,472	—	7,290	—	4,804	—
Lumbwa ..	5	159	20	—	—	179	8,296	—	—	—	300	10,500 (*b*)
Nairobi	8	857	—	87	33	977	14,043	26,268	1,150	609	4,307	—
	238	12,332	14,640	87	35	27,094	365,794	256,389	87,930	28,427	91,742	197,329

(*a*) Acreage protected by diversion ditches as sole protection.

(*b*) This includes dams made under the Swynnerton Plan in African areas.

Dam Construction.—The seven soil conservation units constructed a total of 28 dams during the year. Four of these were in the Elgeyo Reserve, one in Nandi, two in Itembe settlement and the rest were farm dams. A large number of working hours was lost through delays occasioned by the cumbersome procedure instituted this year for the granting of a subsidy for approved works of this kind.

Soil Conservation Finance.—Charges to farmers for soil conservation work remained the same throughout the year. The cost of advisory services was financed entirely from Government funds. Charges invoiced to farmers on 215 accounts totalled £55,489 compared with 450 accounts totalling £55,480 in 1954. The non-payment of outstanding accounts by a minority of farmers continues to be an embarrassment to the service.

Land Preservation Orders.—The Director of Agriculture issued 17 Orders under the Land and Water Preservation Rules in 1955. Five of these provided for the closure of eroded land and the rest required the protection of land by terraces.

The Soil Conservation Inspectors in each European district continued the inspection of farms, drawing the attention of farmers to erosion on their land and advising on erosion problems. In Laikipia and Naivasha districts the enforcement of the regulation compelling farmers to night-boma all stock in one-acre paddocks near their houses has resulted in many cases in the destruction of all grass in the vicinity of the homesteads with consequent soil wash. The work of the River Scouts was particularly effective in the Nairobi and Thika districts where 432 miles of terraces protecting 2,114 acres of African cultivation on European farms were laid out. The inspector for this area visited 206 farms during the year. Overstocking and denudation caused by squatter cattle is a problem in the lower rainfall areas.

Soil Conservation—African Areas

Nyanza Province.—With the exception of the Luo areas the conservation of the soil is generally fairly satisfactory in all African areas of the Province. In the Luo areas uncontrolled stock constantly destroy whatever efforts have been made. Even so the figures show an improvement in these areas and 806 miles of terracing protecting 4,334 acres together with a further 17,594 acres protected by grass strips was achieved in 1955. In North Nyanza 6,410 miles of grass filter strips were marked out and in addition 900 miles of narrow-based terraces and 237 miles of bench terraces were constructed. In the heavily populated Southern Division of North Nyanza the work so far achieved is not keeping pace with the problem and severe gullying is developing from sheet erosion. In the Kisii Highlands all cultivated land is protected by trash lines and elsewhere in this district satisfactory soil control is achieved by the grass filter strip with terracing and ridge cultivation where the need arises. Work on the Nyakatch escarpment was abandoned during the year owing to lack of prisoners but the stone walls constructed have effectively prevented the ingress of cattle and the grass cover has improved beyond recognition.

Rift Valley Province.—The position in this Province remains much the same in that while the cultivated lands are in general adequately protected the grazing areas still present a great problem. In most districts grass strips on the contour and hand-built terraces are the normal means of protection in the arable lands. In Elgeyo the Soil Conservation Unit constructed 17 miles of terraces and a further 1,600 acres were protected by means of cut-off drains in Nandi district. In Baringo district the failure of farmers to maintain soil conservation works resulted in a large number of offenders being convicted. Other conservation measures adopted in the African areas of the Province included the extension of grass planting, the sale of 17,000 tree seedlings from nurseries in Elgeyo and Nandi, and the development of grazing control schemes.

Central Province.—Figures for the construction and reconditioning of terraces in this Province show a drop as compared with last year. Most of the reduction in work took place in Kiambu district where communal labour was fully engaged on Emergency work occasioned by the decision that the whole district should be "villagized". In addition the employment of Kikuyu repatriates to the reserve on relief work was reduced by almost two-thirds in extent. A great deal of bench terracing was constructed in Fort Hall and Nyeri districts. The paddocking of slopes planted to grass continued in both Nyeri and Kiambu. The general standard of conservation work achieved in Kiambu deserves commendation and sets the pace for the rest of the Province.

The planting of trees continued to receive attention, Nyeri district planting out 139,480 trees out of a total of 254,000 trees for the Province as a whole. Grazing control was made difficult by "villagization" but the closure of denuded areas continued. With the building of cattle sheds in the communal villages the making of manure was stepped up in a big way particularly in Embu and Kiambu districts and more manure than ever went on to the land. Details of the soil conservation work done in the Central Province in 1955 are given in the accompanying Table F.

Southern Province.—The terracing work completed in Machakos district during the year amounted to 2,788 miles protecting 15,144 acres altogether and 802 miles of bench terraces were constructed protecting a further 2,000 acres. In Kitui district 13,600 miles of trash lines were put down and 2,000 acres were protected by bench terraces. Reconditioning work in both these districts went ahead and large acreages were cleared of bush, closed to grazing and planted to grass.

The mechanical unit in Machakos district achieved a good year's work with an output of 180 miles of terracing, 10 miles of cut-off drains and 20 miles of roads. Machinery of this unit also constructed 10 dams of all sizes during the year. Perhaps the most noteworthy achievement of all however was the widespread construction of cattle-sheds in Machakos district where 4,610 sheds were erected in 1955. The manure coming out of them is already having a marked effect on crop production. This is an example of extension work in African areas at its best.

As part of the overall conservation plan in Machakos district the programme of reafforestation of the hill areas receives high priority and some 60,000 acres of hilltops have ben handed over by the Location Councils for afforestation. In the words of the Provincial Agricultural Officer—"this is a remarkable act of faith in land-hungry people". Details of the soil conservation work done in the Southern Province in 1955 are given in the accompanying Table F.

Coast Province.—In the Coastal districts the incipient danger of soil erosion is limited. Although the soils are light they are usually flat and porous and most of the area is covered by tree crops or bush. In the hinterland slopes are greater and the soils less porous. Here the system practised consists of laying trash lines throughout the cultivated lands. The laying of trash against live wash-stops of pigeon pea has proved effective in the Mambrui hills of Kilifi district and the construction of narrow-based terraces is now taking place in the Kwale district. During the year 13 miles of terraces were constructed by tractor in the Shimba Hills. In the Teita Hills 1,200 miles of trash lines were laid down and 632 miles of live wash-stops principally of *Coleus* sp. and pigeon pea.

Water Conservation—Mechanical Dam Construction Units

The Engineer's Section of the Soil Conservation Service remained responsible for the work of the units engaged in the building of dams. These consisted of three Government-owned heavy Dam Construction Units and seven district Soil Conservation Units which are equipped with dam-building machinery. The

TABLE F.—SOIL CONSERVATION FOR 1955—CENTRAL PROVINCE AND SOUTHERN PROVINCE

DISTRICT	Narrow Base Terracing	Bench Terracing	Wash Stops	Areas Closed Recon-ditioned	Bush or Bracken Clearing	Grass Planted	Cattle Sheds Built	Compost Pits in Use
	Acres	*Acres*	*Miles*	*Acres*	*Acres*	*Acres*	*Number*	*Number*
CENTRAL PROVINCE:—								
Meru	42	398	37	4,429	5,946	361	227	6,847
Embu	7,329	200	2,775	1,781	4,207	714	1,959	1,808
Nyeri	3,870	3,246	1,428	—	12,613	5,175	1,653	5,556
Fort Hall	5,736	5,862	980	409	19,612	16,022	3,028	8,703
Kiambu	3,400	687	825	5,082	12,339	3,752	680	1,130
SOUTHERN PROVINCE:—								
Machakos	15,144	2,001	—	—	8,657	56,940	4,610	— (*a*)
Kitui	—	2,018	366	59,905	51,572	3,841	— (*a*)	— (*a*)
1955	35,521	14,412	6,411	71,606	114,946	90,805	12,157	24,044
1954	37,365	9,673	3,516	61,442	131,465	38,951	30,439	51,093
1953	54,986	16,821	7,717	54,657	78,938	19,525	12,937	37,773

(*a*) Figures not known.

programme of work for the three heavy units is subject to approval well in advance by the Colony Water Resources Authority but the work carried out is the responsibility of the Engineer's Section.

A total of 41 dams were completed by all units. The water storage capacity created by the year's work amounted to 906,000,000 gallons compared with 842,000,000 gallons in 1954. Unfortunately, exceptionally heavy rainfall in the Kitui district caused the breaching of two of the large dams constructed by No. 1 D.C.U. at the end of the year necessitating repairs which will take some time to complete. There is an inherent risk in the construction of earth dams in such areas as Kitui where long periods of dry weather are broken by violently intense storms. Adequate compaction of dry soil in the embankment is difficult to achieve without sufficient local supplies of water to moisten the fill and severe stresses are set up in completed embankments under the sudden impact of great weights of water occasioned by the rapid run-off from a parched countryside. Details of the work done are given in the following table:—

DAM CONSTRUCTION—1955

UNIT	No. of Dams	Earth Moved	Water Storage	Cost per Cubic Yd.	Tractor Hours Worked	Mean Output per Tractor hr.
		Cubic Yd.	*Mill. gal.*	*Sh.*		*Cubic Yd.*
HEAVY UNITS:—						
No. 1 D.C.U.	4	419,227	420·0	1·32	4,426	72·2
No. 2 D.C.U.	2	61,237	17·0	3·12	1,838	33·3
No. 3 (Nyanza) D.C.U.	7	291,718	388·0	2·21	4,486	65·0
S.C.S. UNITS:—						
Eldoret	10	67,341	—	—	1,643	40·9
Thomson's Falls ..	4	68,655	55·0	—	—	—
Kitale	2	4,650	0·5	—	105	44·2
Nakuru	10	46,183	15·5	—	953	48·4
Ruiru	—	—	—	—	—	—
Lumbwa	2	10,500	10·0	2·70	475	22·1
South Kinangop ..	—	—	—	—	—	—
TOTAL	41	869,511	906·0	—	13,926	42·30

No. 1 Dam Construction Unit spent the year in Kitui district constructing four large dams costing £26,157 with a capacity of 1,554 acre feet. Much survey work as undertaken in connexion with the Kitui programme 37 possible sites for dams being inspected, 17 sites surveyed and plans prepared of 11 sites. The No. 2 Dam Construction Unit remained in South Nyanza during the year where two dams were constructed. Seven sites were surveyed. Delays in re-equipment and European staff difficulties hindered the work of this Unit in 1955. The No. 3 Unit worked in Central Nyanza throughout the year where seven dams were constructed having a combined capacity of 1,504 acres feet and costing £26,500. Eight surveys were completed and plans prepared.

Dam Construction Finance.—The charge for work by the heavy Dam Construction Units remained at Sh. 115 per tractor-hour during the year. Accounts outstanding at the end of 1955 totalled £39,262 of which £25,024 was in respect of dams constructed in the years 1951 to 1954 inclusive.

WATER SUPPLIES—AFRICAN AREAS

Nyanza Province.—A total of nine large dams were built in Nyanza Province in 1955 by the Mechanical Dam Construction Units. The maintenance of dams, has been satisfactory in both South Nyanza and Kericho and in the latter district paid Dam Guards have been withdrawn and the responsibility for maintenance thrown upon the local people. In the Central Nyanza, however, dam hedges are still incomplete in many cases. Homestead water supplies in Kericho, including roof catchments and shallow wells, are a feature of daily progress and the women

are now demanding that their husbands put up a tin roof so that they do not have to go and draw water from the stream. In the high rainfall areas of the Province an individual roof catchment will go a long way to solving the problem of cattle trekking to and from water. In North Nyanza 90 boreholes were drilled during the year of an average depth of 24 feet.

DAMS AND LARGE WATERHOLES CONSTRPCTED—NYANZA PROVINCE

	Before 1952	*1953*	*1954*	*1955*	*Total*
North Nyanza ..	32	1	—	—	33
Central Nyanza ..	38	13	11	7	69
South Nyanza ..	29	32	3	2	66
Kericho	115	—	—	—	115
	214	46	14	9	283

Rift Valley Province.—In Baringo district a hand-rig has been used to find water on smallholdings and three further *haifas* were constructed at Esageri and Chemagoch. The Kibendo pipeline in Elgeyo was completed in September. The Chepkoria area of this district was surveyed with a view to installing a piped water supply to be developed on a loan basis, the local inhabitants meeting the cost (estimated to be about £4,000) over a period of four years. Three large dams and one small one were completed in Elgeyo district and work continues in Nandi district where a further dam was finished by the end of the year.

Central Province.—A few small hand-made dams have been built in Nyeri district. The once-popular hand well-drilling rigs are again coming into use but almost entirely on consolidated holdings on which the owners are prepared to spend money against the day when they can return to live on these holdings.

Southern Province.—In Kitui district 25 earth dams were built and seven concrete dams. The latter were of two types, i.e. rock catchment dams or sub-surface weirs. Seven of the earth dams which had been built by communal labour were breached during the unusually heavy rains of November. Only one dam was built by communal labour in Machakos district. The Mechanical Unit in this district, however, completed ten dams of various sizes, the largest of which has a capacity of 36,000,000 gallons. All these dams were filled during the short rains. Work on the African District Council borehole project continued. Two shafts drilled in 1954 were harnessed and a pump-house and storage tank completed at one of them. Work on the Yatta furrow continued.

Coast Province.—Attention was given during the year to the Teita Hills where irrigation from the mountain streams requires orderly development. Two schemes are under development; one at Mwanda Nyka in the hills has a completed dam forming a reservoir for gravitational irrigation of 25 acres, and the other at Segalla involves the construction of a number of water storage reservoirs.

FIELD DRAINAGE

The Senior Soil Conservation Engineer continued to give attention to drainage problems, visiting areas in the Kinangop, Ol Kalou and Kitale. The mole draining trial at Londiani which has now been in for five seasons is expected to give significant results this season; the moles are still functioning. It is probable that mole draining will have a place in Kenya farming in heavy clays where tile pipe drains can be obtained cheaply enough to use as mains which can be moled over and where labour is available for open drains. An experiment was laid down in 1955 at the Ol Joro Orok station to compare pumice-filled drains, brushwood-filled drains and mole draining.

In the Endebess area 6,000 acres were surveyed and plotted at a 2-ft. vertical interval for the purpose of drawing up a communal drainage scheme.

In the Ruiru area considerable interest is being shown in the cambered-bed system of utilizing vleis. Twenty-eight acres were surveyed for this purpose and other farmers have begun drainage schemes on their own account. It seems likely that this system will also prove the most effective method to use in the Sotik parkland country. Another method which has proved effective here was the digging of diversion ditches on a 1 per cent grade at a distance of 60 feet apart but this has yet to be proved over a cycle of really wet seasons.

Irrigation

Nyanza Province.—The preliminary report for the Kibos/Luanda project from Sir Alexander Gibb & Partners who have been operating on the Kano Plains during the year indicated that most irrigation in this area would be expensive. It is estimated that over 30,000 acres is potentially irrigable on the Kano Plains and that there is a further 10,000 acres approximately in the Yala-Nzoia basin, while it may be possible to reclaim the Yala swamp. Pending the development of pilot schemes based upon the full report of this firm no considerable irrigation works have been carried out on the Kano Plains but there is a big area of irrigated rice under cultivation.

Rift Valley Province.—The scheme to irrigate an extensive area of the Njemps Flats from the Perkerra river in Baringo district made considerable progress. Much development in the form of buildings, roads, levelling of ground and planting of trees and bananas was achieved. A total of 1,200 acres of land has now been cleared for irrigation and 750 acres of this area has been bunded. Good yields were obtained from 100 acres of maize and 120 acres of groundnuts planted during the year. Ten acres of tomatoes for canning have recently been planted. Two plots of 15 acres each are being laid down to compare ridge and furrow irrigation with the method of flood irrigation practised at present. Work on the canals is almost complete but work remains on the headworks. Development work was carried out with labour provided by the works camp for displaced Kikuyu at Marigat.

Central Province.—Progress continued in the development of irrigation works in the Mwea and Tebere plains during the year. The work has now been co-ordinated by the appointment of a full-time Irrigation Manager financed by ALDEV. The drainage of the Nguka swamp has been completed.

Southern Province.—A further six miles of canal were constructed in the Yatta furrow project.

Coast Province.—The scheme to irrigate rice by pumping water from the Tana river on to the Hola plain made some progress during the year. The original plot on the left bank was completely bunded and the two five-acre plots on the two main soil types of the desert had been cleared. A pumphouse had been erected and the bulk of the six-inch rising main to the desert plots had been completed. The soil survey of some 18,000 acres of Tana river flood plain at Garsen was completed under very trying conditions with the co-operation of the Survey Section of the Hydraulic Branch of the P.W.D.

Agricultural Education

Egerton Agricultural College

The plans to set up Egerton Agricultural College with its own funds as a self-governing body came to fruition during the year and the necessary legislation was

passed in June. The Governing body so created consists of a chairman appointed by the Minister for Agriculture; three *ex officio* members, the Directors of Agriculture, Veterinary Services and Education; four members nominated respectively by the Board of Agriculture, the Royal Agricultural Society of Kenya, the Kenya National Farmers' Union and the European Elected Members' Organization and four other members nominated by the Minister for Agriculture.

In July the facilities of the College were made available to the Department and a Soil Conservation and Survey Course lasting the whole month was held there for 22 Assistant Agricultural Officers.

AFRICAN AREAS

Training of Agricultural Instructors.—The institutions at Siriba, Embu and Matuga continued to provide the two-year course for Agricultural Instructors of the Department. Particulars of the instructors trained at these centres in 1955 are given below—

TWO-YEAR COURSE

Province	*1st Year*	*2nd Year*	*Total*
Nyanza (Siriba)	42	26	68
Central (Embu)	30	25	55
Coast (Matuga)	18	11	29
Total entered	90	62	152
Failed	6	6	12
Total passed	84	56	140

The development of the series of smallholdings at each of the schools continued and particularly interesting results have been obtained on a holding of 3½ acres at Siriba. This holding is now supporting four cattle and the maize yield has risen from nine to 22 bags an acre indicating that it should not be impossible to provide for a family from a very small area of intensively manured arable land. The Survey Course previously run at Kisumu has been abandoned since the Survey Department have now taken over the training of surveyors required for farm planning in African areas. Some training in surveying is however included in the Siriba and Embu courses. In Nyanza Province a variety of other courses and study tours were arranged by District Agricultural Officers for Instructors and Siriba students. Most districts in the Central Province held courses for their agricultural staff covering coffee and other cash crops and soil conservation. In the Nandi district of the Rift Valley Province a district course on general agriculture was held with the excellent model smallholding at Kapsabet as a background. In the Southern Province tours were arranged for agricultural instructors.

Farm Institutes.—These continued to cater for the practical training of African farm families during the year. While these institutes appeal to the imagination and should in theory produce a nucleus of better farmers, experience in North Nyanza has not borne this out in practice. Only about six trainees in North Nyanza have turned their experience at the Bukura Farm Institute to good account although some of the ex-Bukura trainees are doing better elsewhere. A further 20 trainees underwent a year's training at Bukura in 1955. There is some doubt that a full complement will be recruited for training in 1956. Development of the Kabianga Institute continued in the Kericho District and the Oyani Institute in South Nyanza. At the Kisii Farm Institute nine familes were in residence during 1955 of which three came from the Kuria division in the far south of the district. The holdings managed by these familes showed profits with one exception. The profit varied from Sh. 65 to Sh. 775 for the crop year 1954/55. A further holding based

on continuous cultivation has been laid down to compare with the holdings based on a short-term ley. At Siriba Institute four farms were occupied throughout 1955. A new farm institute is being established at Kaimosi in the Rift Valley Province and a start was made with the building of staff quarters and labour lines.

School Gardens.—At Primary Schools farms in Nyanza Province the modified 21-plot demonstration system has been carried out satisfactorily. At Intermediate Schools however difficulties have been experienced in developing planned smallholdings particularly in South Nyanza where it was necessary to report three schools for failure to develop their smallholdings and showing no interest in agriculture. In North Nyanza the enthusiasm for farm planning was reflected in the two Intermediate Schools where pupils showed great interest in the school farm. In Kericho district the World Gospel Mission at Tenwek has made very good progress with the school farm and is an example to the rest of the district. In Central Nyanaza slow progress was recorded mainly because smallholdings available are too small for proper demonstration.

The policy in the Rift Valley Province is for school gardens to demonstrate in simple terms the benefits of rotational farming and there was an increase in the general interest shown in these during the year.

In the Central Province there was a great improvement in all School Gardens in 1955. This was due to the improved Emergency situation and the co-operation received from the Education Department. A particularly high standard of cultivation was achieved in the school farms of Embu district.

School gardens in the Southern Province improved considerably during the year. Thirteen more schools in Kitui district had their gardens surveyed and planned.

Young Farmers' Clubs and Better Farming Societies.—A Young Farmers' Club at Kitale was restarted during the year but its activities were restricted by outbreaks of foot-and-mouth disease. There are two clubs functioning in Nandi and two in Elgeyo. Better Farming Societies continued to flourish in North Nyanza and by the end of the year there were at least eight such clubs in existence. Each club usually covers more than 500 acres thus providing an effective focus of better farming. In the Southern Province the Young Farmers' Club movement is bringing about a marked improvement in those school gardens where they are functioning. Interest in the Central Province continues to grow and there are now 39 clubs with a membership of 4,122 young farmers. Particulars of clubs in the Central Province are given below:—

District	*Number of clubs*	*Number of members*
Embu	13	381
Meru	5	150
Nyeri	11	591
Kiambu	—	—
Fort Hall	10	3,000
Total	39	4,122

Many of the Central Province clubs in addition to owning small gardens, now have their own pigs and the young boys keep rabbits at home which they fatten up and sell to the local butchery. In Nyeri district children are often to be seen trundling wheelbarrows of milk thistle and other rabbit food to their villages.

During the year successful Farmers' Days were held at the main research stations of the Department.

Agricultural Shows

The Royal Show of the Royal Agricultural Society of Kenya was held in Nairobi at the end of September and the first day of October. The Department contributed its own exhibits which illustrated the work of the Research Services and organized the Farm and Dairy Produce, District Associations and Farmers' Exhibits Sections.

The first show to be held in the Central Province for some time took place at Meru in September where some 40,000 Africans attended over the two-day period exhibiting great enthusiasm as well as much produce. Successful shows also took place in Elgeyo and Nandi during the year.

Marketing

Produce Marketing and Inspection

Details of the quantities and value of the produce that passed through the markets in 1955 are given in Table D. The position in the African areas during the year was as follows:—

Rift Valley Province.—All maize and wattle bark leaving Nandi district is inspected and a high standard has been maintained. In order to raise the standard of produce from Baringo district an Inspector is being trained and will start work shortly. A Co-operative Society was started in Elgeyo to handle the potato crop and a local market opened in Kapenguria, West Suk district to facilitate the marketing of local produce. A Marketing Officer has recently been appointed who will divide his time between Nandi and Elgeyo districts.

Central Province.—There are two Marketing Officers in this Province, one at Kiambu and the other at Meru. The improvements in the organization of marketing recorded in 1954 for Kiambu district were maintained and consolidated in 1955. The revenue collected by the African Produce Inspectors and the issue of Produce Licences increased from Sh. 51,044 in 1954 to Sh.125,000 in 1955 this coupled with an all-round improvement in the quality of the produce reflects great credit on the Marketing Officer. At Meru the officer combined the duties of Godown Manager for the Produce Control with those of Marketing Officer for the district. In the other districts of the Province the supervision of Produce Inspectors was carried out by officers of the Department with the assistance of the Administration.

Nyanza Province.—Inspection services continued to operate efficiently and there were comparatively few delays occasioned by congested markets when the speed of buying exceeded the speed of acceptance at the Control stores. Marketing in general was started earlier for the 1955/56 season than for the previous one and although the crop is lighter a greater proportion of it had been bought by the end of the year than was the case in 1954/55 particularly the North Nyanza maize crop. The African District Council agricultural services in this Province continue to be wholly dependent on produce cesses a most unstatisfactory position because in a cycle of falling prices the reduction or abolition of such cesses will result in a shortage of money to maintain them. In North Nyanza the maize cess was increased by the African District Council to Sh. 4 per bag which immediately produced resentment on the part of maize growers who considered this taxation unfair. Towards the end of the year the establishment of the Nyanza Province Marketing Board is expected to result in the more efficient marketing of Nyanza products.

Southern Province.—The Produce Inspection Service of the African District Councils dealt with the wattle crop and some vegetables and fruit in Machakos and little more than castor seed in Kitui. The Machakos inspection service is far

from efficient and it is clear that there is evasion of cess on a large scale especially in respect of hides and skins.

Coast Province.—At Malindi eight additional Assistant Instructors are now employed to inspect and grade the cotton crop and grading standards have been maintained at a very high level. This service is subsidized by the Cotton Sales Fund which is now administered by the Cotton Lint and Seed Marketing Board. Inspection services were maintained on cashew nuts which are inspected at the Agent's Stores; copra inspection of which in Kwale district is undertaken by the African District Council; and chillies and vegetables mainly produced in the Teita area of Voi district. With regard to other produce this mostly found its way into Mombasa much of it evading Produce Control.

Co-operation

In the Nyanza Province Maize Co-operative Societies continued to do well—24 new societies were started in North Nyanza and seven in South Nyanza. Maize deliveries in North Nyanza from these societies amounted to 77,588 bags constituting 14.36 per cent of the total deliveries. In South Nyanza the maize societies are subsidiaries of the coffee societies, an arrangement which reduces the overheads but they only produced 1,881 bags of maize. In Kisii a Transport Union was formed as a subsidiary of the Kisii Farmers' Co-operative Union. It manages a fleet of four heavy lorries and made a net profit during the year of £681. Produce was transported for the maize and coffee societies and for 170 African traders. Nine coffee growers' co-operative societies have now been registered in North Nyanza.

In the Central Province Fort Hall district now has seven coffee co-operative societies, Embu 11, Kiambu three, Meru nine and Nyeri three. In Kiambu the pyrethrum societies had a good year, one pineapple society failed and the egg and vegetable societies continued operations. The vegetable producers suffered from a glutted market.

In the Rift Valley Province a co-operative society was started in Elgeyo to handle the potato crop.

In the Coast Province the Teita Vegetable Co-operative Society handles about half the production from the district which goes to Mombasa and amounts to 1,000 tons of vegetables worth £27,500.

Grading and Inspection Services, Mombasa

Inspection.—The number of packages of plants and plant products imported and inspected at Mombasa decreased from 340,267 in 1954 to 267,427 in 1955. The annual total for 1955 is lower than that of the previous two years mainly because there were no imports of wheat or maize for food. There was a considerable increase in "plants" mainly orchids, and fresh fruit, particularly apples from Italy and grapes from Spain. The volume of exports of castor seed continued to fall, the largest decrease being in that produced by Uganda. The quantity of castor seed exported was 137,170 bags compared with 218,229 bags in 1954. The number of bags of Kenya origin was 62,402 compared with 70,210 bags in 1954.

A total of 701 phytopathological certificates were issued compared with 312 the previous year, 528 of them being in respect of hard coffee and 140 for buni and coffee husks. Coffee exported to Egypt accounted for 228 of the certificates and coffee to the U.S.A. 147 certificates.

Grading.—The export of maize continued from the previous year but with this difference that at the beginning of 1955 a change-over was made from old crop

conditioned maize to new crop fumigated maize. For the first seven months of the year there was a main monthly shipment of over 9,000 tons which together with smaller parcels made a monthly average of 9,433 tons. The first four main shipments were white undergrade maize, and the latter three undergrade yellow maize. The main shipments were in bulk, but loading was slow, averaging 24 days per vessel. Great efforts were made to reduce this time full use being made of extra facilities available in the port due to the lull following the dock strike in the United Kingdom, with the result that loading time was reduced to one week and ten days respectively for the last two vessels. From the out-turn reports on four of the vessels the fumigation was satisfactory and there were only moderate local infestations of Tribolium and moths. At the end of the year there were small shipments of yellow maize.

Almost all the beans exported were white haricot beans grown in Tanganyika. Again the quantity fell, but the quality improved, less than 4 per cent being below an F.A.Q. grade. The grading of seed beans has almost entirely ceased. It was a better year for potatoes, exports being up by over 50 per cent largely due to considerable increases in Tanganyika potatoes. The actual increase in Kenya potatoes was only 38 per cent. There were no overseas exports of wheat. The quality of chillies remained low but Kenya-grown capsicums improved steadily in quality but the quantity of the latter was reduced to a little over half of that of the previous year by adverse weather conditions.

PRODUCE GRADED FOR EXPORT (BAGS), 1955

	Maize	Wheat	Beans	Potatoes
K.1	—	3,286	—	—
K.2	—	1,608	5,217	14,749
K.3	—	714	24,821	—
K.4	—	—	1,164	—
K.5	—	260	—	—
K.8 W	607,313	—	—	—
K.8 Y	216,914	—	—	—
K.8 C	27,289	—	—	—
Total Graded	851,516	5,868	31,202	14,749
Rejected	16,432	—	—	152
TOTAL, 1955	867,948	5,868	31,202	14,901
TOTAL, 1954	655,319	3,098	41,725	12,781

Figures for chillies graded are given below and compared with the total of 32,553 bags exported in 1954. The main market for *Capsicum annuum* continued to be Ceylon, with London and Durban also taking considerable quantities.

CHILLIES GRADED FOR EXPORT (BAGS), 1955

	Capsicum Minimum	*Capsicum Annuum*	*Total*
G.A.Q.	66	—	66
F.A.Q.	387	13,335	13,722
Undergrade	5,127	1,638	6,765
Total, 1955	5,580	14,973	20,553
Total, 1954	6,364	26,189	32,553
Total, 1953	5,086	36,664	41,750

Conditioning.—Owing to the change-over from treating grain in conditioning plants to fumigation as the method of preparing grain for export, the plant treated less than one-tenth of the produce dealt with in 1954. However, the plant proved its efficiency and usefulness when drying some very wet maize from Njoro and Rongai which otherwise might have been lost. The plant was only operated for 403 hours during the year as compared with 4,102 hours in 1954. For the first five months of the year the plant averaged 200 tons of white haricot beans a month, and in May was used to dry 450 tons of yellow maize. In July the plant was put to a new use cleaning and treating by heat 556 tons of maize which had accidentally become contaminated with D.D.T., the idea being that the heat would accelerate the breakdown of the toxic properties of the D.D.T.

PRODUCE CONDITIONED (BAGS), 1955

	1954	*1955*
Maize	255,556	12,096
Beans	10,046	11,738
Gram	337	262
Wheat	—	—
Other	—	—
Total ..	265,949	24,096

Fumigation.—The existence at the Coast of a unit capable of fumigating large quantities of produce with methyl bromide under sheets considerably reduced the demand for our fumigation chambers and the total number of bags treated fell from 17,374 bags in 1954 to 7,863 bags in 1955.

Finance.—The revenue from grading maize caused this service to show a profit as the quantity was the second highest since the war. Other commodities graded were below average and the demand for fumigation was much reduced. The conditioning plant was idle so much of the year that overheads put operation costs up to Sh. 4/76 per bag compared with cents 82 per bag in 1954. Plant Inspection, whose revenue is very small, continued to function at a loss. The losses incurred during the year did not absorb the credit balance left at the end of 1954 and the year closed with the combined grading and conditioning service £4,376 in credit. However, unless more work can be found for the conditioning plant the outlook for 1956 is not very bright.

The Quelea Campaign

In late July reports were received from farmers in the Nakuru district that damage to wheat crops was being caused by swarms of the Sudan Dioch. The Tanganyika Department of Agriculture came to our assistance in the form of a visit by their Bird Control Officer, who instructed certain of our officers in a fuel-explosive method of eliminating roosts and of course in the actual location of the roost. Later reports were received that damage was being caused in Timau, Leshau, Nanyuki, Moiben and Wanjohi areas and steps were taken to eliminate the roosts. A total of 26 "blow-ups" were made and approximately 7,600,000 birds are estimated to have been killed at a cost of £2,800. Although the method used was costly it was highly successful and a high percentage kill was obtained, greatly easing the situation.

PART IV—GENERAL

Library

Some 200 books (including bound volumes of periodicals) were added to the Library during the year; owing to the ever-increasing cost of periodicals, particularly the American ones, there is less and less money for books. There was a considerable increase in the number of publications circulated to members of the Department and the public (3,500 as against 2.500 in 1954). Four issues of the departmental newsletter appeared during the year. The exchange scheme started in 1953 by the Librarian of the Veterinary Research Laboratories has now been taken over by this Department. Seventy-six volumes or wanted parts of periodicals were received and 59 gifts of spare parts were made.

Publications

The following is a list of articles by departmental officers published during the year: —

Birch, W. R.—Ley establishment at the high altitudes in Kenya, Part 6. *R.A.S.K. Quarterly Journal,* No. 5, p. 3.

Bogdan, A. V.—Herbage plants at the Grassland Research Station, Kitale. *E. Afr. agric. J., 20,* 151, 1954/5.

Brook, T. R.—Soil and Water Conservation. *Coffee Board Monthly Bulletin, 20,* 65, 1955.

Bumpus, E. D.—Grassland Research Progress (1954). *R.A.S.K. Quarterly Journal,* No. 7, p. 30.

De Lotto, G.—Three Apparently New Coccids (Hemipt. : Coccidea) from Eritrea. *J. Ent. Soc. S. Africa, 17,* 213.

———— Three New Coccids (Hemipt. : Coccidea) attacking Coffee in East Africa. *Bull. ent. Res. 46,* 267, 1955.

Dixon, G. E.—Interim Report on the Co-operative Maize Trials at Njoro, Kitale, Machakos and Matuga. Paper submitted to the Specialist Committee on Agricultural Botany, Kawanda, October, 1955.

Dixon, G. E., and Thorpe, H. C.—*Puccinia polysora* in Maize: Progress Report on Breeding Work, II. ibid.

Dougall, H. W.—Fertilizers for ley establishment, existing leys and selected pastures. *R.A.S.K. Qrly. J.,* No. 8, p. 5, November, 1955.

Dougall, H. W.—Correction of "Crude Fibre" estimation for the effect of altitude. *Nature,* v. 175, 28th May, 1955.

Duff, A. D. S.—Resistance to Take All Disease in Kenya Wheat 131, II: Effect on Yield. *E. Afr. agric. J., 21,* 32, 1955/56.

Duff, A. D. S., and Gilmour, J. A.—The Treatment of Loose Smut of Barley. *E. Afr. agric. J., 20,* 225, 1954/55.

Kroll, U.—The Cultivation of Pyrethrum in Kenya. (New edition of booklet published by the Pyrethrum Board of Kenya.)

———— Mechanization in Pyrethrum. Paper read at the Conference on the Mechanization of Agriculture, Entebbe.

Jones, P. A.—Rotary Cultivation in Kenya Coffee. Submitted to the Mechanization Conference held at Entebbe, June, 1955.

Le Pelley, R.—The Citrus Bud Mite, *Aceria sheldoni* (Ewing) *Eriophyidæ* in Kenya. *E. Afr. agric. J., 21,* 22, 1955.

Lerche, K.—Plant Management. *Kenya Sisal Board Bulletin,* No. 11, p. 33, January, 1955.

Melville, A. R.—Annual Report, Coffee Team Services. *Coffee Bd. Bull., 20,* 120, 1955.

Nicholls, A. F.—Use of Sisal Waste and Fertilizers in Sisal Growing. *Kenya Sisal Board Bull.,* No. 14, p. 43, October, 1955.

Pereira, H. C., and Jones, P. A.—Field Responses by Kenya Coffee to Fertilizers, Manures and Mulches. *Coffee Bd. Bull., 20,* 298, 324.

Rayner, R. W.—Leaf Rust Epidemic Warning to Coffee Planters. *Coffee Bd. Bull., 20,* 64, 1955.

Robinson, J. B. D.—Chemical Weed Control in Mulched Coffee Inter-rows. *Coffee Bd. Bull., 20,* 182.

———— A Note on Green-vein Chlorosis of Coffee. *E. Afr. agric. J., 20,* 195, 1954/55.

———— Second Progress Report on Chemical Control of Weeds in Coffee. *Coffee Bd. Bull., 20,* 151, 1955.

———— Recommendations for the Chemical Control of Weeds in Mulched Coffee. ibid. *20,* 88, 1955.

———— A Simple Method of Determining Soil Depth in Coffee Soils. ibid. *20,* 14, 1955.

Strange, R.—Forage Legumes for Medium Altitudes in Kenya. *E. Afr. agric. J., 20,* 221, 1954/55.

———— Management of Permanent Pasture in the High-Rainfall, Mixed Farming Areas. *R.A.S.K. Qrly. J.,* No. 7, p. 5, August, 1955.

———— The Management and Utilization of Temporary Leys at Medium Altitudes. ibid. No. 6, p. 7, May, 1955.

Thorpe, H. C.—Cereals in Kenya, 1955/56. *K.I.O. Fortnightly,* No. 290 (3877).

———— Release of New Cereals. ibid. (3878).

———— Notes on a Single-seed Pedigree Seed Scheme. ibid. No. 291 (3889).

———— Maize Pollination and Crossing. ibid. No. 302 (4018).

Thorpe, H. C., and Duff, A. D. S.—A Note on the Appearance of Two Stem Rust Forms in East Africa. *E. Afr. agric. J., 21,* 61, 1955/56.

———— *Puccinia polysora* in Maize: Progress Report III. Paper submitted to the Specialist Committee on Agricultural Botany, Kawanda. October, 1955.

Webster, C. C.—Research (Plans) (Note). *R.A.S.K. Qrly. J.,* No. 7, p. 21.

Agricultural Legislation

The most important legislative measure enacted during the year was:—

The Agriculture Ordinance, 1955.—The need for one comprehensive Ordinance dealing with the protection and development of the land had long been recognized, and this Ordinance, as its long title implies, is designed to accomplish three main objectives: (i) the preservation and improvement of the soil and its fertility; (ii) the provision of the means of developing agricultural land in accordance with the accepted practice of good land management and good husbandry, and (iii) the promotion of financial stability in agriculture. Part I deals with interpretation, Part II with guaranteed prices and marketing, Part III, The Scheduled Areas, Agricultural Committees and sub-committees, Board of Agriculture; Part IV, Preservation of the soil and its fertility; Part V, Development of land in the Scheduled Areas; Part VI, General Schemes for land preservation and development; Part VII, Loans for these purposes; Part VIII, Ensured production of sufficient food crops; Part IX, Non-Scheduled Areas; District and

provincial agricultural committees and Land Development Board; Part X, Preservation and development of land in the non-scheduled areas. Part XI, Appeals to the Agricultural Appeals Tribunal; Part XII, General; Schedules.

The following comprise the other more important legislative enactments affecting agriculture during 1955:—

The Cereals Finance Corporation Ordinance, 1955.—Sets up a Corporation to borrow the money required by Government for the purchase of cereals, makes it possible for money to be obtained from London short-term market as well as from other sources.

The Egerton Agricultural College Ordinance, 1955.—Establishes the College as an independent self-governing institution with a statutory governing body; deals with financial provision for the College and establishes the Egerton Agricultural College Fund.

The European Agricultural Settlement Ordinance, 1955.—The previous Ordinance, enacted in 1948, vested all executive powers in the Minister (then Member) for Agriculture, the Board acting in an advisory capacity only. The present Ordinance transfers the Minister's powers and duties to the Board, incorporates and reconstitutes it. The land previously vested in the Crown and used for the Tenant Farming and Assisted Ownership Schemes is transferred to the Board for the same objects. The Ordinance includes the usual incidental powers granted to any body corporate to enable it to achieve its task.

The Marketing of African Produce (Amendment) Ordinance, 1955.—The main provision in the amending Ordinance is a new Part III making legal provision for the establishment of Marketing Boards for the marketing of produce grown by Africans. The existing Ordinance is also amended in minor respects.

The Seeds Ordinance, 1955.—The existing Seeds Ordinance, passed in 1948, was never brought into operation and this Ordinance replaces it. It is designed to improve the standard of internal seed supplies and to develop a reputable export trade. Part I deals with interpretation; Part II, Testing of seeds; Part III, Control of the import, export, sale and use of seeds and seed potatoes; Part IV, Certificates; Part V, Registered seed growers; Part VI, Registered seed merchants; Part VII, General powers of inspectors and miscellaneous provisions; Part VIII, Power to make rules; Part IX, Offences and penalties.

Other legislation enacted during the year was as follows:

Ordinances.—The Maize and Sorghum (Imposition of Cess) (Amendment) Ordinance, 1955, the Maize Subsidy Repayment (Repeal) Ordinance, 1955; the Sisal Industry (Amendment) Ordinance, 1955 (enables Board to invest surplus funds in trust securities; transfers power to make rules from the Governor in Council to the Minister for Agriculture, subject to the advice of the Board, and increases the maximum penalty for offences to Sh. 2,000).

Rules and Regulations, etc.—Agriculture Ordinance: Agricultural committees areas, production areas, scheduled animal products (producer prices) order, land development loans (European Agricultural Settlement Board to be a bank for the purpose), scheduled areas. Coffee Industry Ordinance: Levy. Cotton Lint and Seed Marketing Ordinance: Buyers' Licences and Fees Regulations, 1955. Crop Production and Livestock Ordinance: Baringo District (Amendment) Rules, 1955 and grazing fees thereunder; Cashew Nut Marketing Rules (buying date and minimum price); Native Lands Tea (Amendment) Rules, 1955; Samburu (Grazing Control) Rules, 1955, and grazing fees; Wattle Bark (Improvement and Inspection) Rules (amendment to schedule); green

wattle bark and wattle bark marketing. Crown Lands Ordinance: Ithanga (Grazing Control) Rules, 1955 and (Soil Conservation) Rules, 1955. Defence (Control of Maize) Regulations: modification in 1954 African maize prices; producer price for 1955 planted maize. Defence (Controlled Produce) Regulations: prices. Exporting Duty Ordinance: Hides and Skins (Variation of Duty) Order; Sisal Fibre (Abolition of Duty) Order. Flax Fund Ordinance: Commencement order. Grading of Wheat for Local Purchase Rules: prices. Increased Production of Crops Ordinance: F.O.R. price for wheat. Kenya Cotton Ordinance: Transfer of ginning licence; uprooting and burning order, Coast Province. Maize and Sorghum (Imposition of Cess) Ordinance: Imposition of Cess (Accounts) Rules, 1955; cess. Marketing of African Produce Ordinance: establishment of marketing board for Nyanza Province. Native Lands Trust Ordinance: Emali-Lower Makueni (Grazing Control) (Amendment) Rules, 1955; Reconditioning of Makueni (Amendment) Rules, 1955. Plant Protection Ordinance: prohibition of import of Indian hemp, coca and poppy (*P. somniferum*); prohibition, planting of maize and sorghum. Sisal Industry Ordinance: imposition of cess. Sugar Ordinance: application of parts of Ordinance to the Central Province. Water Ordinance: General (Amendment) Rules, 1955.

Staff

Mr. A. H. Savile was appointed to fill the newly created post of Chief Agriculturalist to be responsible for all agricultural development in the African areas under the expanded agricultural development plans. He came from Tanganyika in March for three months before taking the leave that was due to him. Otherwise Headquarters operated at full strength. Mr. G. S. Cowley was promoted to be Assistant Director (Field) in charge of a Province, and Messrs. G. T. Hughes-Rice and G. J. Gollop were promoted to be Provincial Agricultural Officers on the super scale. Four newly trained Agricultural Officers, Messrs. N. K. Dale-Jones, P. W. A. Davies, J. A. N. Wallis and W. D. Ware-Austin joined the Department during the year together with Mr. M. N. Harrison, Plant Breeder, D. B. Thomas, Pasture Research Officer, J. A. Bullock, Entomologist. Dr. F. J. Nutman, Principal Scientific Officer, and Dr. (Miss) F. M. Roberts, Principal Senior Scientific Officer, were seconded from the Colonial Research Service to work on the Coffee Berry Disease.

Mr. D. P. Taylor came on transfer from the Sudan and Mr. C. Turner from the National Agricultural Advisory Service as Agricultural Officers, and Messrs. V. E. M. Burke, E. Yates, E. N. Kidner, C. W. Barwell and J. Gurr were promoted or appointed locally to be Agricultural Officers, Mr. P. V. M. Quiggin, Chief Grader and Inspector, and Messrs. E. Cottington, J. P. Benson and C. F. Newton, Senior Assistant Agricultural Officers, were promoted to the C.2 grade.

Recruitment improved greatly during the year for qualified staff, only five posts of Agricultural Officer, one Statistician and one Biologist (Bird Control) remaining to be filled in the professional grades. Similarly a great improvement in recruitment to fill Assistant Agricultural Officer vacancies in the Colony Development and Swynnerton Establishments took place in the latter half of the year partly due to a very successful recruitment tour in the United Kingdom by Mr. A. Storrar, Assistant Director (Field), and partly due to an improvement in local recruitment. At the beginning of the year only 20 vacancies remained to be filled. It is pleasing to record that in the first time for several years was it possible to recruit Africans with suitable qualifications, one having taken a degree in agriculture in India and two having successfully completed the Makerere College Agricultural Diploma course.

The number of Africans having passed the K.A.S.S.E. and School Certificate examinations who came forward for training as Agricultural Instructors again increased.

Conclusion

Once more I would like to record my very grateful thanks to all members of the staff for their continued loyalty, their enthusiasm and their forbearance in the many irksome tasks which have of necessity, been thrust upon them.

With the retirement towards the end of the year of Sir Ferdinand Cavendish-Bentinck from the post of Minister for Agriculture, which he has so very ably held for many years, I would like to place on record the Department's appreciation and grateful thanks for his wise guidance and ever-forthcoming support.

I would like also to mention the Department's great regret at the departure of Dr. Webster to Malaya and to wish him every success in his new post. During his five years in Kenya, Dr. Webster was very largely responsible for a rapid build-up in the research strength of the Department both in men and facilities, and his masterly organization of research and its co-ordination both within the Department and with outside agencies will be of lasting benefit to Kenya.

Nairobi,
28th February, 1956.

G. M. RODDAN,
Director of Agriculture.